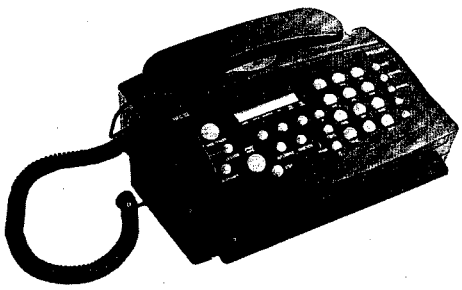
Service
Service
Service

HFC41
HFC42



Service Manual

HFC41

Is a compact Feature phone, and an integrated FAX machine combined with an Active Fax Switch.

HFC42

Is a compact Feature phone, a FAX machine and an integrated answering machine TAM, combined with an Active Fax Switch.

Specially prepared for Cordless Telephones, DECT Technology.

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1 Introduction

In this chapter you can find

← Safety precautions
← List of features
← Feature description
← Operating elements

1 SAFETY PRECAUTIONS

1.1 IMPORTANT

1. The HFC 41 and HFC 42 are specificated as a Class II unit (ungrounded).
   All digital circuitry is connected to the potential of the Telecom line.
   That means: If you want to measure in the unit with connected Telecom line you have to use **ungrounded** measuring instruments. Otherwise it is possible that you shorten the Telecom potential to ground.
2. Service technicians must be made AWARE OF ESD and be GROUNDED!
   To avoid ESD risk you can order some ESD-equipment in the parts list
3. After each disassembly of the apparatus a high voltage test has to be performed.
   (3kV AC between mains and Telecom line)
4. **Attention**: Discard used of Spare Parts not according to manufacturers instructions.

WARNING!

Before opening the machine disconnect the Power Cable.

Never remove the isolationplate from the PGU

- HIGH VOLTAGE! -

1.2 ESD

1.2.1 General

ESD is a spark jumping from one conductive surface, charged with static electricity to another conductive surface. This incredibly fast movement of static discharge (the charge can jump to that conductor in a nanosecond)
can have disastrous consequences, especially for electronic circuitry.
We only feel ESD at a discharge of about 3.000 Volts.
However many semiconductors can be damaged by a discharge of just 60 Volts or less.
On non-conducting materials, such as plastics and textiles, charges remain stationary and cannot discharge and are therefore called static charges.
Static charges are brought in by people and are generated during their normal movements.

1.2.2 Precautions to prevent ESD-damage

Static electricity cannot be eliminated but it can be kept under control. Charging can be prevented by an appropriate grounding system for people and objects that may come into contact with the component or product.

TO PREVENT ESD KEEP THE FOLLOWING RULES:

1. All products being brought in for repair must be
   - processed in an ESD protected working area with a Grounded dissipative mat.
   - kept in ESD protective packing material when not used.
2. Technicians should wear a wrist strap ground connected.

2 FEATURES

2.1 FEATURES

Some features are not available in certain countries.

Telephone features	
Built in handset	
12 key dial pad	
On hook dial	
Ringer volume control	Digital (4 steps)
Speaker volume control (HFC 42)	Digital (4 steps)
Redial	Last number dialed
Pulse/tone dialing	User selectable
Dialing features	
Automatic Redial	Auto only for fax
Manual Redial	dial pad
Short dial	Two touch - 9 keys
Name dial	Alpha input max 50
Usage Code	Babysitter function
Transmission	
Manual Transmission	from key pad
Half speed Transmission	fall back
Send documents during a talk	press Start key
Voice request	Speak after fax TX
Faxing to sub-addresses	telephone number with * or # key
Reception	
Automatic reception	
Manual reception	Press Start key
Polling reception	Info Taste
Active FAX switch	
Day mode	Fax priority
Night mode	TAM always active
Auto mode	Day and Night activity time
Easy Link	Call transfer from/to external device
Communication	
Page Header	includes TTI + page indicator
TSI / CSI	RX and TX
Compression methods	MH / MR
Copy quality	
Fine, Photo, Standard	
Automatic background control	16 shades
TAM features - HFC 42 only	
Speech Generation.	Digital TAM OGM
Skip forward	
Replay message	
Pause	On current play operation
Erase one message	
Erase all messages	
Forwarding calls	
Time date stamp	
OGM	2 OGM are available
Breakthrough	Call screening
Remote operation	
Memo mode	Internal (note book), External (TA)
Lists and Reports	
Transmission report	
Error report	
Service report	
System report	Including BSW and NCU-Parameter settings
Stored No. list	
Function list	Including current setting list
SRAM data list	
LIU-Parameter list	
Scanner Reference Line - Printout	
Service features	
BSW setting	
NCU parameter setting	
SRAM data setting	
LIU-parameter setting	

Others	
Compatibility - G3	
External phone Interface	Cordless phone-Answering machine management
Clock setting	
Language setting	
LCD size - 1x16 and a line of 6 icons	
ROM size -256 Kbyte	
Power Safe-Mode	automatic

2.2 IMPORTANT FEATURES

2.2.1 Telephone features

ON HOOK DIAL

Handset stays on hook. Press Dial key. Lift the handset to speak.

RINGER VOLUME CONTROL

The volume of the ringer can be adjusted by pressing the arrow left and right key.

SPEAKER VOLUME CONTROL

If the machine is off hook, the speaker volume can be adjusted via software setting by pressing the arrow left and right key.

PULSE/TONE DIALLING

Switchable during dialling via a key sequence (tone/pulse setting via user function 14).

2.2.2 Dialling features

AUTOMATIC REDIAL

Only for Fax operation. 3 tries if line is busy. (see also NCU #11/12).

MANUAL REDIAL WITH REDIAL KEY

Repeat the last dialled phone number by pressing redial key (->->).

SHORT DIAL

By pressing the key 1-9

NAME DIAL

By pressing the Telephone Book key A-Z, stored names can be accessed.

USAGE CODE

To block Inter/National, or Total (no access at all). In the Total mode, a pre stored number will be dialed when Off-Hook. Baby sitter function.

2.2.3 Transmission

MANUAL TRANSMISSION

A document can be send by only pressing the START key.

HALF SPEED TRANSMISSION

Automatic fall-back. Starting at 4800-2400bps

SENDING DOCUMENTS DURING A TELEPHONE CALL

Insert the document and press the start-key time during a telephone call. During the transmission voice communication is interruptet.

VOICE REQUEST

While sending a fax, lift the handset. The other party will hear a ringing signal at the end of the fax transmission. Talk after the fax TX is possible.

FAXING TO SUB-ADDRESSES

After the number press * or # for sub-addresses. Please check local Telephone Sistems for compatibility.

2.2.4 Reception

AUTOMATIC RECEPTION

Fax mode

MANUAL RECEPTION

After you recognize CNG tone, press START. The reception begins.

POLLING RECEPTION

Press the Info Key to access the desire telephone numbers.

2.2.5 ACTIVE FAX switch

DAY mode HFC41 (no TAM)

Fax Auto: Automatic Reception no CNG delay.
Fax Manual: Manual fax reception or remote activated from an ext device. DTMF remote fax start code requiered.
Fax Expert: The fax sizes the line. Activates RX when CNG detected, or activate Toll free rings, which by-pass the fax-switch, for external devices. External devices are supported depending on the Toll free ring set-up.
Fax silence is detected only when Toll free rings is 0. The total ammount of rings recomended, in this mode is 5, to avoid anomarlities.

NIGHT mode HFC41 (no TAM)

Fax Quiet: Automatic fax reception with CNG detection delay.
Fax Expert: The fax sizes the line. Activates RX when CNG detected, or activate Toll free rings, which by-pass the fax-switch, for external devices.External devices are supported depending on the Toll free ring set-up.
Fax silence is detected only when Toll free rings is 0. The total ammount of rings recomended, in this mode is 5, to avoid anomarlities.

DAY mode HFC42

Fax Auto: TAM off. Automatic Reception no CNG delay.
Fax Manual: TAM off. Manual fax reception or remote activated from an ext device.
DTMF remote fax start code requiered.
Fax No Ring: TAM off. Automatic RX after CNG detection delay. Silent fax reception.
Fax Auto: TAM on. Allows Fax RX as well as incoming voice messages. TAM on. The fax rings at least once to allow manual reception. The fax size the line, and activates the internal TAM for voice messages, or fax RX after CNG delay detection.
Fax Manual: TAM on. No automatic fax RX. If CNG is detected during OGM, the unit should disconnect the line. This mode supports parallel devices.
Fax No Ring: TAM on. Silent Automatic RX with CNG detection. The internal TAM goes active for voice messages.
Fax Expert: The total number of rings specifies how often the unit rings before fax RX starts, respectively before the TAM will be switch on.
The fax sizes the line and activates the fax switch after the toll free rings.
Silence fax reception is only possible if the toll free rings is set to 0.
TAM can be configured as:
- completly disable (fax RX after total number of rings
- enable (switch to TAM after total number of rings)
- enalble and muted (no OGM and no ICM audible)

DAY mode HFC42

TAM Ring 1-4. Auto fax RX only between 1 and 4 rings. Then TAM is active.
TAM Silent: TAM will be inmediately enable, Laudspeaker disable. Silent operation.
Fax Expert: Same as Active DAY operation. In the NIGHT mode, is not possible to disable the internal TAM completely.

RING BACK (440/700HZ)

The FAX-machine takes the line immediately after a ring has been detected, to provide the possibility of silent fax reception.
Due to this fact the FAX machine has to generate the ringback by itself.
The ringback signal will be generated as often as the customer has defined the toll free number of rings.
With BSW 06/5 the frequency of the ringback signal can be changed (440/700Hz).

2.2.6 Communication

PAGE HEADER

TTI and page number are printed on each fax that will be transmitted. It is possible to turn off the page header.

TRANSMIT TERMINAL IDENTIFICATION (TTI)

Identifies the user's fax unit by including the name and fax number that has been programmed into the fax unit on the top of every page. This allows the receiving parties to easily identify the source of all documents being sent to them. FCC regulations also require that transmitted documents identify the sender's name, phone number, transmission date and time.

TSI / CSI

TSI: Identification (Tel. Nr.) of the transmitting machine
CSI: Identification (Tel. Nr.) of the receiving machine

COMPRESSION METHODS

Modified Hoffman: method to reduce the data transferred via the telephone line. All G3 machines offer M.H.-coding.
Modified read: efficient coding system that increases speed by about 15%. M.R. is not available in some G3 machines.

2.2.7 Copy quality

fine: increased resolution, 7,7 lines/mm for transmission of detailed drawings or small characters
photo: fine resolution mode, 16 grey levels

COPY MODE

Select fine or photo mode with the RESOLUTION key and press START.

AUTOMATIC BACKGROUND CONTROL

The background control (=intensity difference between the text and the background) is adjusted automatically.

2.2.8 TAM features (HFC42)

DIGITAL TAM

Messages are recorded with solid state devices, no tape is used for recording

RECORDING TELEPHONE CONVERSATIONS

You can record a telephone conversation with your fax machine.

SKIP FORWARD

Move to next message

REPLAY MESSAGE

Last message is repeated

PAUSE

If you press the PLAY/PAUSE key during play operation, the playback is interupted.

ERASE ONE MESSAGE

The message you have heard can be deleted after hearing the confirmation tone twice.

ERASE ALL MESSAGES

This function erase all recorded messages

FORWARDING CALLS

Incoming messages are automatically forwarded to a preprogrammed telephone number.
You can select the number of messages to be forwarded at the same time.
The party to which the calls are being forwarded needs to enter the access code.

TIME DATE STAMP

The fax machine will automatically record the date and time of every recorded message. If you play back a message, you will data on display.

OGM

There are two outgoing messages available.
OGM1: The caller will be told to leave a message
OGM2: The caller will be informed about the end of the recording

BREAKTHROUGH

Ringing despite switched on answering machine
If you have activated the function you will hear no rings ans any incoming call will be answered automatically.
Only callers who dial the breakthrough code (4-digit) can let the fax machine ring.

REMOTE OPERATION

Via DTMF dialing the recorded messages can be played back from any place you want.

Funktion	Key
Stop	(0)
Pause/Play	(1)
Forward	(2)
Rewind	(3)
Delete this only	(4)
Delete All	(5)
Repeat All	(6)
Record OGM	(8)
Switch TAM ON/OFF	(9)

MEMO MODE

Internal memo

You can record a personal message with this function. Your fax machine thus becomes a note pad. Messages can only be heard on the fax machine itself or by remote control from a telephone.

External memo

You can record a message which the caller can hear without being able to leave a message in return

2.2.9 Lists and Reports

TRANSMISSION/ERROR REPORT

Every time you send a document your fax machine prints a transmission report. If an error occurs during transmission you will be informed by the error report, which is printed out.

Examples for transmission - and error report

SENDEBERICHT 15-MAI-98 9:07

VON (BESITZER):	+43 1 12345
AN:	+43 1 54321
GEWÄHLTE NUMMER:	0043 222 54321
SEITE (N):	1
DAUER:	0,42"
AUFLÖSUNG:	STANDARD
ERGEBNIS:	OK

SERVICE REPORT

TIME	ERR.CODE	REMOTE MACHINE	TX/RX	PAGES	SP	RESOL.	CODING
	04		R	0			
	04		R	0			
	42						
	04		R	0			
	40	4316010112345	R	1	96	STANDARD	MR
	31	4316010112345	R	2	96	STANDARD	MR
	40						
	06	4875	T	1	96	STANDARD	MR
	04		R	0			
	06	4316010154321	T	1	96	STANDARD	MR
	42						
	06	4316010112345	R	2	96	FINE	MR
	06	4172	T	0			

SERVICE REPORT

Listing of occured transmission-errors.

SYSTEM REPORT

Listing of current settings including the BSW- and NCU parameter list

UNAUTHORISED CALL REPORT

If you have chosen selective fax reception and you receive a fax call from an unauthorised party, a report is printed with the sender identification of the calling fax machine.

STORED NO. LIST

This function provides you with a list of the short dial and name dial numbers you have stored.

FUNCTION LIST

Listing of all functions including a current settings list

SRAM(MEMORY)-DATA LIST

Partial selectable listing of SRAM contents

LIU-PARAMETER LIST

Listing of all LIU-OTPROM data

SCANNER REFERENCE LINE - PRINTOUT

The scan. ref. line is a graph of the current CIS-condition

2.2.10 Service features

BSW-SETTING

Change the Bitswitch settings

NCU-PARAMETER SETTING

Change the NCU-parameter

SRAM(MEMORY) DATA SETTING

Change the SRAM data

LIU-PARAMETER SETTING

Change the LIU-parameter

2.2.11 Others

CLOCK SETTING

Set actual date and time for a correct fax header.

LANGUAGE SETTING

You can select the language in which messages are displayed and reports printed out. There is a choice of three languages.

POWER SAVE MODE

Power save is a mode where the machine has a power consumption less than 3W. The machine turns off most of the hardware components and goes in a special mode where only important events are checked.
The machine goes **automatically** in the power save mode, when the user has not made any action for the last 2 minutes and the machine is not in *idle* mode.
Idle mode: the machine waits for the next action,- e.g. automatic redial). This mode can be recognized by checking the " : " of the clock display.
In power save mode the colon stops blinking!

Error Led is flashing (no paper, paper jam, ...)

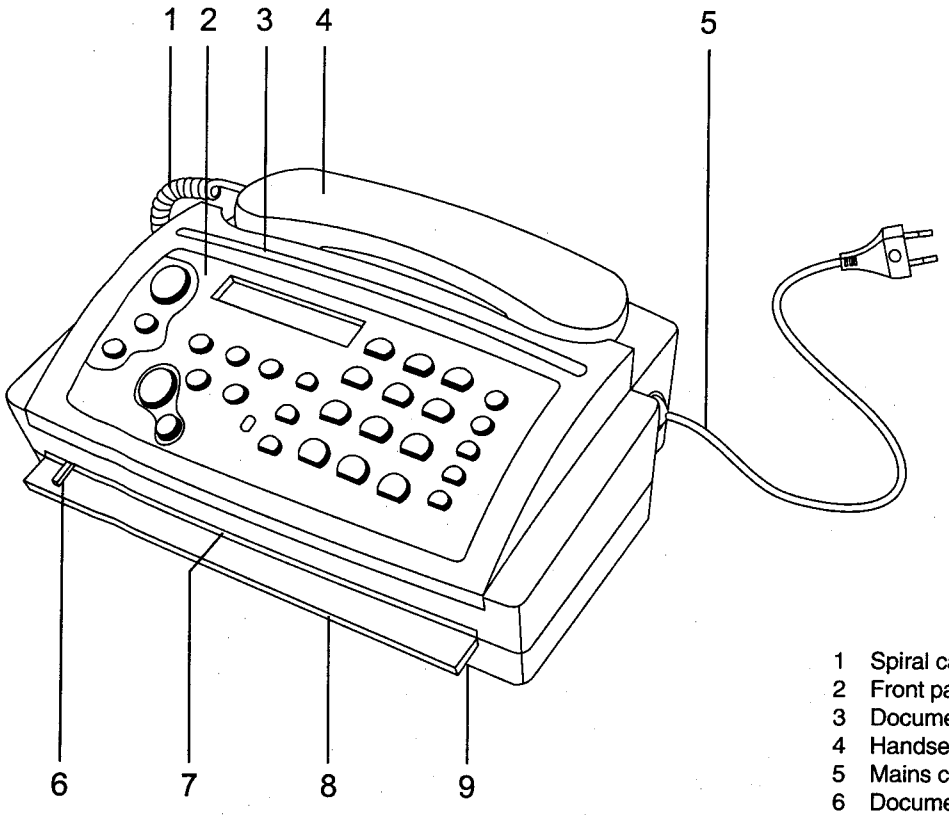
Actions during power save:

Scanning the keyboard
Updating the LCD (every minute)
Updating the clock
Checking the sensors
Checking of incoming rings

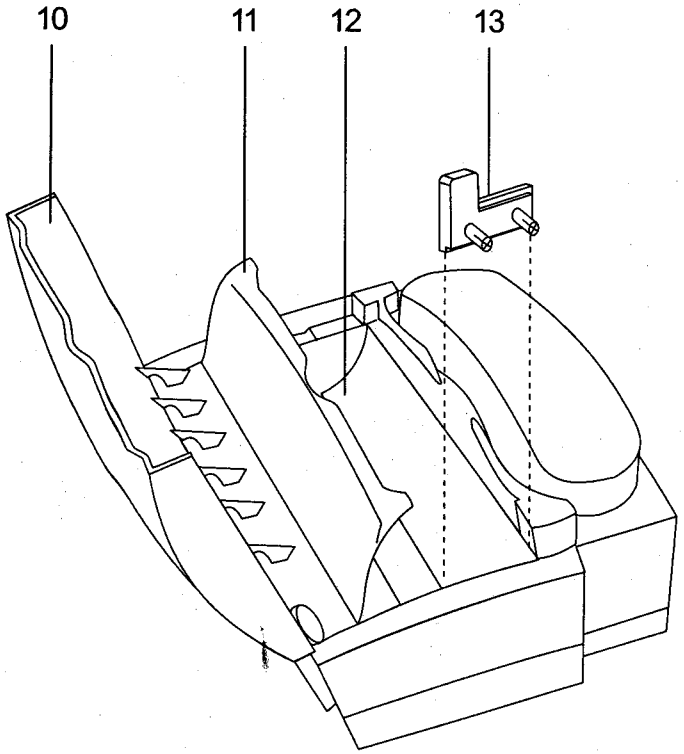
The machine will wake up from power save by following events:

Key pressed
Ring detectedDocument inserted
Handset lifted
External phone detected

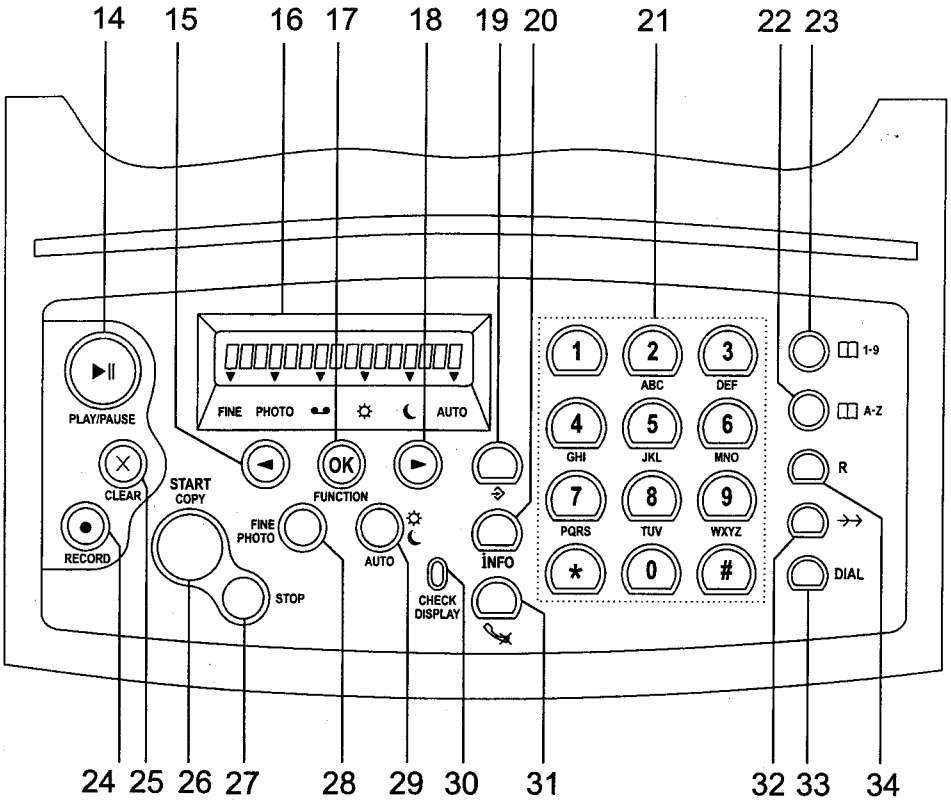
OPERATION ELEMENTS



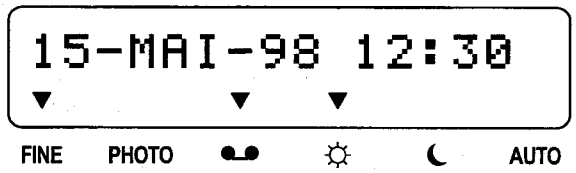
1 Spiral cable for the telephone handset
2 Front panel
3 Document outlet
4 Handset
5 Mains cable with power plug
6 Document guide
7 Document feed slot
8 Paper tear strip
9 Thermal paper outlet



10 Front panel
11 Paper guide
12 Paper compartment
13 Distance plate
(for 210 mm thermal paper rolls)



14 PLAY/PAUSE: to play back message. Flashes when messages have been recorded
15 CURSOR LEFT:to move Cursor, select options, adjust volume
16 Display: remove the protective foil before use.
17 FUNTION/OK: to access functions or confirm entries
18 CURSOR RIGHT: to move the cursor, select options, adjust the volume
19 STORE: to store names and numbers
20 INFO key: for easy polling from the Info memory over the polling option
21 Dial Key Pad: to dial and store names
22 TEL. BOOK: to access and call numbers from memory
23 SHORT DIAL: to dial quick telephone numbers
24 RECORD: to record your out-going messages and memos
25 CLEAR: to erase messages and entries
26 START/COPY: to start Fax transaction or to make copies
27 STOP: to interrupt procedures
28 FINE/PHOTO: to chose a higher quality for TX or Copies.
29 DAY/NIGHT/AUTO: to choose type of mode. The right settings can be chosen in funtions 31 DAY, 32 NIGHT, 33 AUTO.
30 ERROR indicator lamp
31 MUTE. mutes the line during a call, or call-tranfer to serial connected devices
32 REDIAL: redials the last number dialed, or make pause inbetween two numbers
33 DIAL: to dial with handset on hook
34 R-key: in PBAX aplications, to transfer the call.



The pointers on the display indicate different modes:

FINE/PHOTO indicate whether you send or copy with a higher resolution or with grey tones. If none of the two is visible, the standard resolution is selected.
To change the resolution use the RESOLUTION - key.

TAM/DAY/NIGHT/AUTO are FOUR different modes to operate your fax machine. You can choose between the modes with functions 31 to 33.

II Functions

In this chapter you can find

← Print out of the Function List
← User Function (basics)
← Description Service Mode
← Description Service Functions

4 GENERAL

4.1 FUNCTION LIST

The function list is a summary of all user and service functions and includes additional current settings. The structure of all functions is divided in two sections: User functions and Service functions

Example for the Function list (Service mode HFC41):

Function List

1 SET UP	2 communication	3 FAXSWITCH	4 OTHERS
11 SET DATE/TIME 12 YOUR TEL. NR. 13 YOUR NAME 14 DIAL MODE 15 SET LANGUAGE 16 PAGE HEADER	21 SLOW (4800BPS) 22 POLLED RECEP.	31 DAY 32 NIGHT 33 AUTO 34 EASYLINK	41 REMOTE OPER.
6 ADJUSTMENTS	**7 RECONFIGURE**	**8 GENERAL TESTS**	**9 TEL. UNIT**
61 MODEM TEST 62 dtmf test 63 output level 64 frequency chk 65 FACTORY ADJ. 66 SCANNER ADJ. 67 PRINT SCANREF	71 SYSTEM REPORT 72 SERV. REPORT 73 SET BITSWITCH 74 NCU PARAMETER 75 CHANGE MEMORY 76 PRINT MEMORY 77 DISPLAY FLAGS 78 DISPLAY RINGS 79 DISPLAY TESTS	81 RAM TEST 82 KEY test 83 LED TEST 84 LCD TEST 85 SPEAKER TEST 86 PRINTER TEST 88 TPH DROP	91 LIU PARAM

CURRENT SETTINGS

YOUR NAME:
your tel. NR.
dial mode: TONE
PABX: NO
DAY:
Night:
EASY LINK:

ROM VERSION: V1.04 AB DE

Example for the Function list (Service mode HFC42):

Function List

1 SET UP	2 communication	3 FAXSWITCH	4 OTHERS	5 ANSWERING DEV
11 SET DATE/TIME 12 YOUR TEL. NR. 13 YOUR NAME 14 DIAL MODE 15 SET LANGUAGE 16 PAGE HEADER	21 SLOW (4800BPS) 22 POLLED RECEP.	31 DAY 32 NIGHT 33 AUTO 34 EASYLINK	41 REMOTE OPER.	51 RECORD. TIME 52 ACCESS CODE 53 BREAK T. CODE 54 MEMO MODE 55 FORWARDING
6 ADJUSTMENTS	**7 RECONFIGURE**	**8 GENERAL TESTS**	**9 TEL. UNIT**	
61 MODEM TEST 62 dtmf test 63 output level 64 frequency chk 65 FACTORY ADJ. 66 SCANNER ADJ. 67 PRINT SCANREF 68 OGM LEVEL	71 SYSTEM REPORT 72 SERV. REPORT 73 SET BITSWITCH 74 NCU PARAMETER 75 CHANGE MEMORY 76 PRINT MEMORY 77 DISPLAY FLAGS 78 DISPLAY RINGS 79 DISPLAY TESTS	81 RAM TEST 82 KEY test 83 LED TEST 84 LCD TEST 85 SPEAKER TEST 86 PRINTER TEST 87 FLASH TEST 88 TPH DROP	91 LIU PARAM	

CURRENT SETTINGS

YOUR NAME:
your tel. NR.
dial mode: TONE
PABX: NO
DAY:
Night:
EASY LINK:

ROM VERSION: V1.04 AB DE

4.2 COMPONENTS

4.2.1 User and Service functions

USER FUNCTIONS

← Set up
← Communication
← Active Fax Switch
← Others
← Answering device (HFC 42)

NOTE: To keep the use of the functions as simple as possible, they are grouped logically. You can print out a list of all user functions by pressing the FUNCTION key twice and OK.

THE SERVICE FUNCTIONS CONTAINS THE CHAPTERS:

← Adjustments
← Reconfigure
← General tests
← Tel. unit

NOTE: Print Service Function list in the Service mode. (Stop-Start 3 times)

4.2.2 Current settings

For a prompt survey of all important informations Current settings list is added under the Function list.

THE CURRENT SETTINGS LIST CONTAINS:

← Your Name:	Stored name (see function 13)
← Your Tel Nr.:	Stored telephone number (see function 12)
← Dial mode:	Selected dial mode (see function 14)
← PABX	Select PABX mode (see function 14)
← DAY mode	Select mode (function 31)
← NIGHT mode	Select mode (function 32)
← AUTO mode	Select mode (function 33)
← Easy link	External Phone DTMF start code. (see function 34)
← ROM Version:	Software version, Country code...

5 USER FUNCTIONS

5.1 TABLE OF USER FUNCTIONS

5.1.1 Set up

Nr	Function name	Description
11	Set date/time	Current date and time. This setting is lost if power off/on. By pressing STOP the display shows "DIAL/INSERT DOC."
12	Your Tel. Nr.	This CSI Tel. number is transmitted within the page header.
13	Your name	This name is transmitted within the page header.
14	Dial mode	PABX operations.
15	Set language	Set language for display messages and report printouts.
16	Page header	Your Number and Your Name, are printed on every transmitted page. Page header: on/off location: inside/outside image
17	Usage code	Programable access-dialing code and Baby sitter mode.

5.1.2 Communication

Nr	Function name	Description
21	Slow (4800bps)	Half speed transmission (4800 baud: ON/OFF)
22	Polled reception	To call another station and receive a document.
26	Paper save	Reduce the height of the receiving document to save paper provided that the document is sent in standard mode.
27	Mercury	There are two services of MCL, the residental C132 and the 2300 service which can be accessed via most BT-lines. (for UK only)

5.1.3 Faxswitch

Nr	Function name	Description
31	DAY	Fax behaviour. Auto, Manual or Expert (TAM on/off HFC 42)
32	NIGHT	Fax behaviour (HFC41); TAM behaviour (HFC42)Quiet or Expert
33	AUTO	Fax automatic RX
34	Easy link	call transfer between external devices. DTFM code needed

5.1.4 Others

Nr	Function name	Description
41	TRANSM. REPORT	
42	Dialing list	

5.1.5 Answering device - HFC 42 only

Nr	Function name	Description
51	Recording time	Setting for the recording duration of calls 30 /60 / 120sec / AUTO.
52	Access code	To set the code for remote TAM control.
53	Breakthrough code	Authorised callers can override the answering device.
54	Memo mode	To record a internal or external message.
55	Forwarding	Message forwarded to another telephone number.

6 SERVICE FUNCTIONS

6.1 ACCESS TO SERVICE FUNCTIONS

6.1.1 To enter a service function

1. Press START, STOP, START, STOP, START within 3 seconds (Handset on hook).
2. Select Functions with the numeric keypad or the keys LEFT and RIGHT and press OK.

6.1.2 To exit a service function

1. Press STOP twice in each function, to go into the standby mode.
   The FUNCTION key toggles between special functions in a group.
2. After timeout (40 sec), the system will switch the service mode off.

NOTE: For service functions the keys LEFT, RIGHT, OK, *, #, START and STOP are used. For hexadecimal values a Shift-key (R-key) must be held down and the keys 0...5 must be pressed to enter A through F.

HEX	A	B	C	D	E	F
R-key &	0	1	2	3	4	5

6.2 TABLE OF SERVICE FUNCTIONS

6.2.1 Adjustments

Nr	Function name	Description
61	MODEM test	To check the correct function of the modem-chip (external measuring instrument needed).
62	DTMF test	To check the correct function of the telephone microcontroller (external measuring instrument needed).
63	Output level	FACTORY USED ONLY
64	Frequency check	To generate and output a sine wave with selectable frequency (100 Hz steps) at the defined output level.
65	Factory adjust	1.)To check software and country version. 2.)To set correction value for the output level (external measuring instrument needed). 3.)To make a SRAM clear and reset (all RAM contents are set to default).
66	Scanner adjust	Used to check the correct function of the LED-array.
67	Print scanner	reference line used to check the CIS.
68	OGM level	To set the output level for the OGM. -HFC 42-

6.2.2 Reconfigure

Nr	Function name	Description
71	System report	Prints out the current system parameters. Used before changing battery or replacing FCU.
72	Service report	Prints out the most recent 15 error codes. Used before changing battery or replacing FCU.
73	Set bitswitch	Used to change bitswitch settings.
74	Set NCU parameter	Used to adjust parameters for dialling and timing detection.
75	Change memory	Used to check or change the RAM/ROM contents.
76	Print memory	Used to print out a certain memory area.
77	Display flags	FACTORY USED ONLY
78	Display rings	FACTORY USED ONLY
79	Display tests	FACTORY USED ONLY

6.2.3 General tests

Nr	Function name	Description
81	RAM test	To test correct function of RAM.
82	KEY test	To test correct function of all keys.
83	LED test	To test correct function of all LED's.
84	LCD test	To test correct function of the LC-display.
85	Speaker test	To test correct function of built in speaker.
86	Printer test	To test correct function of the thermal head.
87	Flash test	To check AS-Flash storage. -HFC 42-
88	TPH drop	To check the heith of the TPH

6.2.4 Tel. unit

Nr	Function name	Description
91	LIU parameter	To specify the functionality of the LIU-parameters.

NOTE: Do not use service functions 77, 78, and 79; they are only for factory use. If used, the machine might do a SRAM clear !!

6.3 SERVICE FUNCTIONS

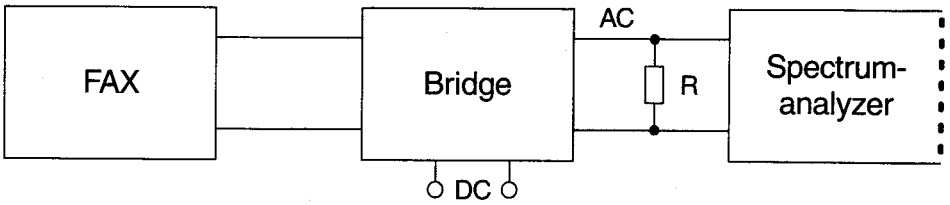
6.3.1 Adjustments

MODEM TEST - FUNCTION 61

This function permits to send a specified frequency or baudrate to the telephone line for measuring purposes (9600,7200,4800,2400,300 Baud 1100,2100 Hz).

1. Enter the service function (see section 6.3). The machine goes on the line.
2. By pressing one of the keys (* and #) the user can define which signal is output by the modem chip. The LCD shows the specified frequency or baudrate.

Blockdiagram for the measurements of functions 61-64



The value of R is depending on the spectrumanalyzer.

DTMF TEST - FUNCTION 62

This function permits to send a specified DTMF signal to the telephone line for measuring purposes.

1. Enter the service function (see section 6.3).
2. By pressing one of the numeric keypad (0-9,* and #) the user can define which DTMF signal will be sent out by the telephone microcontroller to the telephone line. The DTMF signal is also sent to the speaker. To dispatch a continuous DTMF tone, the DTMF continuous mode bit in LIU PARAM. must be set (tone is sent as long as key pressed). Switch the machine OFF/ON, to activate the new function.

OUTPUT LEVEL - FUNCTION 63

This function permits to change and define the output level for sending signals (CNG, CED, FSK and high speed pixel data) to avoid a telephone line problem.

1. Enter the service function (see section 6.3).
2. By pressing one of the keys (* and #) the user can define the output level (in 1dB steps), it is also shown on the right corner of the LCD and is stored immediately. (Range: 0dB ... - 15dB).

NOTE: The real range for the output level depends on PTT requirements for each country.

FREQUENCY CHECK - FUNCTION 64

This function permits to send a definable frequency to the telephone line and the speaker. The frequencies can be set in 100 Hz steps with a defined output level.

1. Enter the service function (see section 6.3).
2. Press LEFT to select send. With * and # the user can define the sending frequency with the specified output level.
3. Press RIGHT to select receive.Receive tests which digital filters are active.

FACTORY ADJUST - FUNCTION 65

This function consists of two levels. The first level gives SW-informations about the version number, creation date and country code. The second level permits to set the correction value for the OUTPUT LEVEL or to make a RAM CLEAR if necessary.

NOTE: Make a print out of the system report (service function 71) and the dialling list (user function 52) before doing a RAM clear.

1. Enter the service function

   The LCD shows: | FACTORY ADJ |

   X = Software version
   D = Day
   M = Month
   Y = Year
   C = Country

2. Press Start

   The LCD shows: | V.1.28 21.01. 98 AT |

3. Press LEFT to select "Output Level"
   With * and # the user is able to adjust the correction value for the output level (range from 1..255).

4. Press RIGHT to select "RAM Clear"

   The LCD shows: | 0.LEV RAMC |

   If START key is pressed, a soft reset is performed, which includes a whole ARAM test and a SRAM clear. After reset all bitswitches and NCU parameters are set to the initial default values.

WARNING!
The complete RAM will be cleared, that means all CSI
and changed BITSWITCHES and NCU parameters will be erased.

SCANNER ADJUST - FUNCTION 66

Use this function to check the correct functioning of the scanner LED array.

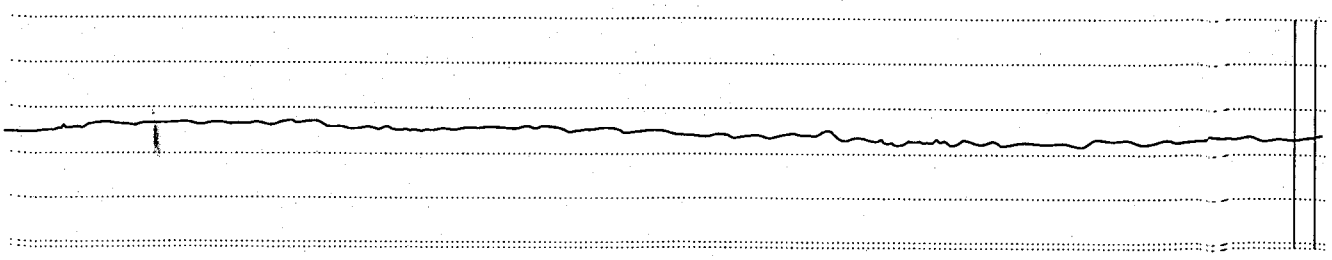
1. Enter the service function (see section 6.3). The CIS-LED array is on.
2. Press STOP - the CIS-LED array is off.

PRINT SCANNER REFERENCE LINE - FUNCTION 67

Use this function to check the CIS via print out of the scanner reference line. The reference line is a diagram of the correction values which are used for the auto shading correction. If the line comes close to the top level or if there are significant peaks it indicates problems with the CIS. Clean the scanner roller and the scanner or replace the CIS. Test scanner performance by making a test copy in photo mode. There shall not be significant vertical dark stripes. Whenever a document is inserted, the background control is performed using the scanner roller as the white reference.

1. Insert a white document slowly and remove it again.
2. Enter the service function (see section 6.3). The scanner reference line is printed out.

Example for a Scanner reference line:



OGM LEVEL - FUNCTION 68

Use this function to adjust the output level of the OGM.

1. Enter the service function (see section 6.3).

2. With the * and # keys on the numeric keypad the value on the right side of the LC-display can be changed to adapt the required level -min.OGM level:
   255 max. OGM level: 000

3. Press the STOP-key to finish this function. The changing value is accepted.

6.3.2 Reconfigure

SYSTEM REPORT - FUNCTION 71

Use this function to print the actual system parameters like TTI, CSI, ROM/LIU-Version, CCITT number, Maker code, Country Version, Bit switches and NCU parameters.
If possible, print out this list before repairing or replacing the FCU and before refilling the system parameters.

Enter the service function (see sectin 6.3). The system report list will be printed now.

Example for a System report:

SYSTEM REPORT

```
YOUR NAME:
YOUR TEL. NR.:
ROM VERSION:        V0.25 BB 09.07.96 12:06   DE 060 01 0   L00 432
LIU VERSION:        V01 D F
CCITT/MAKER:        A/1
OUTPUT LEVEL:       -09DBM

BITSWITCH   DEFAULT   ACTUAL     BITSWITCH   DEFAULT   ACTUAL
       00  00000010   00000010          0A  00000000   00000000
       01  00000000   00000000          0B  00001000   00001000
       02  00001001   00001001          0C  00001110   00001110
       03  00011000   00011000          0D  10000000 * 11000000
       04  01000000   01000000          0E  11000000   11000000
       05  00011000   00011000          0F  00100101   00100101
       06  00001000   00001000          10  00110000   00110000
       07  00011100   00011100          11  00000000   00000000
       08  01001011   01001011          12  10000010   10000010
       09  00001000   00001000          13  10001100   10001100

NCU PARAM.   DEFAULT   ACTUAL     NCU PARAM.   DEFAULT   ACTUAL
     0/00   42/2A     42/2A          48/30   32/20     32/20
     1/01   150/96    150/96         49/31   3/03      3/03
              "         "              "       "         "
    47/2F   32/20     32/20          95/5F   85/55     85/55
```

Line "ROM VERSION" means:

SW-V.	Ctry-Set	Date	Time	LIU-Ctry	OPU-conf	F.code	ARAM-amount	LIU-code	Built Nr.
V0.25	BB	09.07.96	12:06	DE	060	01	0	L00	432

Line "LIU VERSION" means:

e.g.:

SW-Version	Dialmode	R-key
V01	D (DTMF)	F(TIME BREAK)
P (PULSE)	E(EARTH)	

Columns "BITSWITCH/NCU PARAM" means:

e.g.:

Bitswitch	Nr.	Default value	Actual value
00	00000010	00000010	

e.g.:

NCU	Parameter Nr.	Default value	Actual value
	Dec/Hex	Dec/Hex	Dec/Hex
	0/00	42/2A	42/2A

SERVICE REPORT - FUNCTION 72

see section 9.1

SET BITSWITCH - FUNCTION 73

Use this function to change a bit in the config bitswitch area.
The bitswitches are listed

> **WARNING !**
>
> Do not change a bit switch that is described as "Not used", as this may cause the machine to malfunction or to operate in a manner that is not accepted by local regulations.

1. Enter the service function

   The LCD shows: | BSW:00 XXXXXXXX | (cursor blinks under NN)

   NN — BSW-adress, starts with 00 (HEX)
   XXXXXXXX — Value field; each X stands for a single bit setting. 0=not set=set

2. Enter the required BSW-adress via the numeric keypad and the R-key with the numeric keys 0 - 5 simultaneous for A - F to change the address field (all input values are hexadecimal). It's also possible to in/decrement the address with "*" or "#".
3. Press START to move from address field to value field.
4. To change a certain bit use the numeric keypad-just type its position number now

bit-number:	7	6	5	4	3	2	1	0
position	x	x	x	x	x	x	x	x
eg.: BSW 07:	0	1	0	1	0	1	0	1

   ->BSW 7/Bit 0,2,4,6 are set

   NOTE: If the bit was initially (before setting) "1", it's now "0" and vice versa.
5. Press START to switch back to address field.
6. Press OK to exit this function, followed by STOP.

NCU PARAMETER - FUNCTION 74

Use this function to adjust parameters for timing detection and dialling.
The NCU parameters are listed in section 6.4.2.

1. Enter the service function (see section 6.3)

   The LCD shows: | NCU:00 XXX | (cursor blinks under NN)

   NN — NCU-adress, starts with 00 (HEX)
   XXX — Decimal value setting of NCU parameter NN

2. Enter the required NCU parameter-adress via the numeric keypad and the R-key with the numeric keys 0 - 5 simultaneous for A - F to change the address field (all input values are hexadecimal).
   It's also possible to in/decrement the address with "*" or "#".
3. Press START to move from address field to value field.
4. Change the desired value (DEC) via the numeric keypad

   e.g.: | NCU:1F 010 | -> NCU 1F is set to value 10 (DEC)
5. Press LEFT or RIGHT to correct wrong Data entries.
6. Press START to switch back to address field.

   NOTE: Changing the value is immediately accepted, no way return to previous if mistyped!
7. Press OK to exit this function, followed by STOP.

CHANGE MEMORY - FUNCTION 75

Use this function to check the ROM/RAM and change the RAM contents.
The RAM addresses are listed i

WARNING!

The user must be well aware of the meaning of these locations before making any change in RAM!
This may cause the machine to malfunction.

1. Enter the service function
2. The LCD shows: | ADD:00C000 00 | (cursor blinks under NNNN)

   NNNN Memory address (HEX)
   XX Memory data (HEX)
3. Use LEFT and RIGHT to control the cursor.
4. Press START to switch over from the address to the data field.
5. With the keys 0 - 9 on the numeric keypad and the R-key with the numeric keys 0 - 5 simultaneous for A - F the address and data field can be changed (all input values are hexadecimal).
6. With the * and # keys on the numeric keypad the address can be increased or decreased.

NOTE: Changing the data is immediately accepted, no way return to previous if mistyped!

7. Press OK to finish this function.

PRINT MEMORY - FUNCTION 76

Use this function to printout a certain memory area.

1. Enter the service function
2. Enter the start address or accept the given range and press OK.
3. With the keys 0 - 9 on the numeric keypad and the R-key with the numeric keys 0 - 5 simultaneous for A - F the address field can be changed (all input values are hexadecimal).
4. With the * and # keys on the numeric keypad the address can be increased or decreased.
5. Enter the end address or accept the given range and press OK. A print out of the selected area will be made.

Example for a Memory-print out

```
000000 : ef a4 00 c0 3f f0 7f da  c0 00 01 a2 54 a5 80 c0   %ñ.l?&äul..=tñcl
000010 : fe 04 05 55 a5 05 73 c0  fe 04 06 59 a5 02 00 c0    4[..uñö.-lÆy..l.
000020 : fe 08 40 ea ff ff ff e9  12 00 00 00 c0 00 7c a5   cÇg...#..üü£@..l
000030 : 08 57 a6 00 02 6e f8 04  54 8e 04 00 03 8f c8 04   d©..Å©-..§#ll..£
000040 : 44 cc 03 04 00 0a c0 00  00 0a 02 ff ff c2 8f      ?&äul..=t..3df.-
000050 : c8 04 1c 88 04 00 1a ff  ff ff e2 7c a5 f8 12 00   6§äuu.-©=]..ncl.
000060 : 7c a5 14 5f c8 00 5f c8  08 57 a6 00 02 6e f8 04   .h..§©99gh.f..qö
000070 : c0 00 01 a2 54 a5 80 c0  fe 04 05 55 a5 05 73 c0     §..[*..k5.6.?l..
000080 : 00 0a 02 ff ff ff c2 8f  fe 08 40 ea ff ff ff e9   ££.-lgh.r##...Æy
000090 : 08 57 a6 00 02 6e f8 04  44 cc 03 04 00 0a c0 00   Å©-..§ñö.-lÆg...
0000a0 : c0 00 01 a2 54 a5 80 c0  fe 04 05 55 a5 05 73 c0   .ñö.-lÆy..l.u.-©
0000b0 : fe 04 05 55 a5 05 73 c0  7c a5 14 5f c8 00 5f c8   &äul..=tñ©=].£.-
0000c0 : ff ff e2 7c a5 f8 12 00  ef a4 00 c0 3f f0 7f da   g...#..üü£@-lÆy.
0000d0 : 00 0a 02 ff ff ff c2 8f  c0 00 01 a2 54 a5 80 c0    äul..=t..3dÇg...
0000e0 : 05 55 a5 05 73 c0 00 00  fe 08 40 ea ff ff ff e9   &äu-..§ñö.-l%ñ.l
0000f0 : c0 fe 08 40 7c a5 fc 12  7c a5 14 5f c8 00 5f c8   .h..§©99gh.f..qö
```

DISPLAY FLAGS - FUNCTION 77:

NOTE: Do not use this function. It's only for factory use!
If used, the machine might do a SRAM-clear!

DISPLAY RINGS - FUNCTION 78:

NOTE: Do not use this function. It's only for factory use!
If used, the machine might do a SRAM-clear!

DISPLAY TESTS - FUNCTION 79:

NOTE: Do not use this function. It's only for factory use!
If used, the machine might do a SRAM-clear!

6.3.3 General tests

RAM TEST - FUNCTION 81

Use this function to do a RAM TEST, after the test the result will be returned.

1. Enter the service function (see section 6.3)
   The RAM is tested by writing 55h to RAM, shift left 1 bit and check with AAh if it is correct or not. The test does not destroy the contents of the RAM.
2. Check the LC-display:
   If an error occurs the display shows it and is displayed for 3 seconds and the message "RAM TEST ERROR" is printed.
   If no error is found, the message "RAM TEST OK" is printed.

KEY TEST - FUNCTION 82

Use this function to do a KEY TEST, after the test the result will be returned.

1. Enter the service function (see section 6.3).
2. Press the keys of the control panel in a certain sequence.
   The LCD indicates the key to be depressed.
   The test is finished when the last key (the "START" key) is pressed. If all keys have been pressed correctly, the message "KEY TEST OK" is printed, otherwise the message "KEY TEST ERROR" is printed.

LED TEST - FUNCTION 83

Use this function to do a LED TEST, after the test the result will be returned.

1. Enter the service function (see section 6.3).
   All the icons of the LCD and the LED on the control panel are flashing in turns.
2. Check if the LED and all icons are OK.
3. If all LED's are working correctly press "START", the message "LED TEST OK" is printed.
4. If one of the LED's is defective press "STOP", the message "LED TEST ERROR" is printed.

LCD TEST - FUNCTION 84

Use this function to do a LCD TEST, after the test the result will be returned.

1. Enter the service function (see section 6.3).
   The LCD should display a black pattern alternating.
2. Check if all the dots of the LCD are switched on and off.
3. Press "START", if all dots are correct the message "LCD TEST OK" is printed.
4. Press "STOP" if one of the dots is defective, the message "LCD TEST ERROR" is printed.

SPEAKER TEST - FUNCTION 85

Use this function to do a SPEAKER TEST, after the test the result will be returned.

1. Enter the service function (see section 6.3).
   Now the speaker sounds.
2. Press "STOP" if the result is bad, the message "SPEAKER TEST ERROR" is printed.
3. Press "START" if the result is correct, the message "SPEAKER TEST OK" is printed.

PRINTER TEST - FUNCTION 86

Use this function to print a test pattern for checking the result.

1. Enter the service function (see section 6.3).
   Diagonal, vertical and horizontal lines will be printed.

FLASH TEST - FUNCTION 87

This function permitts to check and clear the contents of the AS-FLASH storage.

1. Enter the service function (see section 7.3)

   The display shows: | START:00 |

2. Press LEFT or RIGHT and OK to clear the AS-FLASH contents

CHECK: Do a check of the directory and the data pointed from directory entrys. By pressing OK, the validation check is done and a **long beep** sounds if the check was **invalid**. That means the directory structure and the data pointed to are invalid. This function can be used after any action with flash.

CLEAR: Do a whole clear of the AS-FLASH chip. By pressing OK, the whole contents of the AS-FLASH chip will be cleared and the directory structure and variables which are used for the AS-FLASH are reinitialized. After that action a system reset is performed to garanty a correct initialization and working of the application.

WARNING!

If using CLEAR the complete AS-FLASH will be cleared, that means all speed and name dial numbers in the AS-FLASH will be cleared too.

6.3.4 Tel. unit

LIU PARAMETER - FUNCTION 91

The following specifies the functionality of the LIU-parameters.

1. Enter the service mode (see section 2.1).

   The LCD shows: | LIU PARAM RD/WR |

2. Press LEFT or RIGHT and OK to print the settings.
3. Press OK to edit the settings.

   The LCD shows: | LIU ,0 003 | (cursor blinks under NN)

   NN LIU address (HEX)
   XXX LIU data (DEC)

4. Select the start address with '*' and '#' or the numeric keypad and press 'START'.
5. Edit the data with the numeric keypad.
6. Press LEFT or RIGHT to control the cursor.
7. Press START to select the next address.
8. Press STOP to save and leave function 91.

Example for a LIU-Parameter print out:

```
                                    LIU PARAM
LIU PARAM.   DEFAULT    ACTUAL
     0/00     3/03      3/03
     1/01     0/00      0/00
     2/02    85/55     85/55
     3/03    10/0A     10/0A
     4/04    20/14     20/14
     5/05    15/0F     15/0F
     6/06   236/EC    236/EC
     7/07    85/55     85/55
     8/08    85/55     85/55
     9/09    20/14     20/14
    10/0A    60/3C     60/3C
    11/0B     0/00      0/00
    12/0C     0/00      0/00
```

Addr. (HEX)	Function
00	Dial Mode Register
01	Pulse Mode
02	Inter digit time
03	Flash time
04	Access pause time
05	DTMF level high
06	DTMF lev. difference
07	DTMF on/off
08	DTMF off
09	Min ring frequency
0A	Max ring frequency
0B	PABX output level
0C	Country Codes

e.g.:	LIU Parameter Nr. Dec/Hex	Default value Dec/Hex	Actual value Dec/Hex
	0/00	3/03	3/03

LIU - address HEX 00

Address HEX 00 defines the DIAL MODE REGISTER

Bit Nr.:	7 6 5 4 3 2 1 0
e.g. BIN:	0 0 0 0 0 0 1 1 = Data 03 (DEC)

Bit Nr.	Function	Set	Description
0	dial mode:	0	PULSE
		1	DTMF
1+2	not used		
3	extended dialing	0	normal dialing: 0-9, *,#,RECALL, rest no used
		1	extended dialing: 0-9,*,#,A,B,C,D
4+5	not used		
6	DTMF-mode	0	tone timed
		1	tone as long as key pressed (the tone on time is as long as the specific key is pressed but it has a minimum time which is the same like DTMF-mode is 0.)
7	MSG-mode		If pulse dial is selected and '*' or '#' will be pressed then dialmode will be switched to DTMF.
		0	Inactive: '*' or '#' will not dialed out - a pause will be made. It's not possible to switch back to pulse dialing.
		1	Active: '*', '#' or 'R' will be dialed out after the last interdigit pause has been performed. By pressing the R-key it's possible to switch back to pulse dialing (after DTMF has been finished).

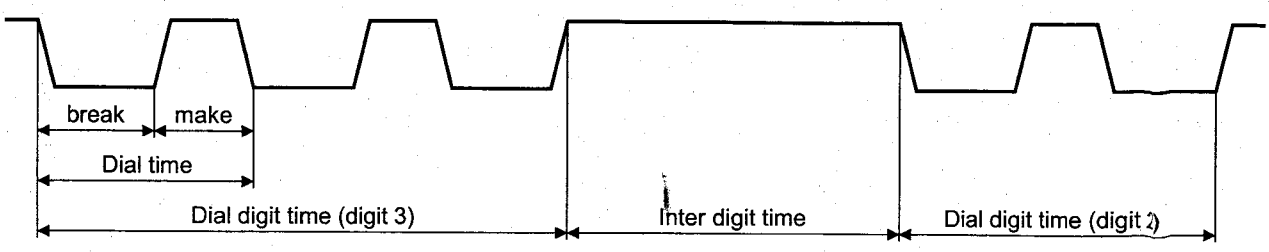
Switching from pulse dial mode to DTMF: Switching from pulse to DTMF dialing will be done by pressing the digit '*' or '#'. If bit 7 of the dialmode register is set the digit will be dialed out otherwise a pause is made and the dialmode will be switched (access pause time).

Switching from DTMF mode to pulse dial: Switching from DTMF to pulse is only possible if dialmode has first been switched from pulse to DTMF and bit 7 of the dialmode-register is set.The controller switches back to pulse after flash has been processed.

LIU - address HEX 01

Address HEX 01 defines the PULSE MODE

General: Pulse Dial is performed by disconnecting and reconnecting the line in a defined way. A number is represented by a number of digits. Each digit is represented by a number of disconnections according the number to dial. Any 'Break' (calling the disconnection) is followed by a 'Make' (a re-connection) until the complete digit is dialed. Between two digits a pause is neccessary (inter-digit delay) before the next digit is ready to dial.



The timing relationship consists of two dial speeds calleds PPS (**P**ulse **P**er **S**econd):

10PPS and 20PPS (each part of a digit is dialed in 100ms or 50ms)
Additional an off/on+off ratio (break ratio) can be choosen

PPS	break ratio (%)	break (ms)	make (ms)	dial time (ms)
10	60	60	40	100
10	66	66	33	100
20	60	40	20	50
20	66	34	17	50

e.g.: Bit Nr.: 7 6 5 4 3 2 1 0

BIN 0 0 0 0 0 0 1 0 => Data 2
BIN 0 0 0 0 0 0 1 1 => Data 3

Bit Nr.	Function	Set	Description	
0	Dialing Speed	0	10 PPS	
		1	20 PPS	
1	Break/Make Ratio %		**10 PPS**	**20 PPS**
		0	60/40	40/20
		1	66/33	34/17

LIU - address HEX 02-0B

Addr. (HEX)	FunctionValue	Divide value by	Description
02	Inter digit time (delay)	10...2550ms	10mssee fig.1
03	Flash time	10...2550ms	10ms
04	Access pause time	100...6500ms	100ms
05	DTMF level high	-2...-15dbm	-1dbm
06	DTMF level difference	4...+4dbm	0,1dbm*)
07	DTMF on/off	3...255ms	1ms
08	DTMF off	3...255ms	1ms
09	Min detected ring frequency	10...100Hz	1Hz
0A	Max detected ring frequency	10...100Hz	1Hz
0B	PABX output level	-	not defined now

*) For negative values calculate: 256 - (Value x 10)

LIU - address HEX 0C

Address HEX 0C defines the COUNTRY CODES.

eg.: For PROM-DA it's possible to select Austria(10) Netherland (07),
a.s.o. Software might not be available for some countries.

Country	DA	DC	DE	
Germany	0B			
Austria			10	
Neatherlands		07		
Belgien		0F		

6.4 TABLE OF BSW AND NCU-PARAMETER

6.4.1 BSW listing

The bitswitches are the 1-bit sytem parameters that determine the machine's behaviour.
They can be modified with function 73.

LOOP CURRENT DETECTION

BSW	Bit	Settings	Description
00	3	1 = OFF 0 = ON	Loop current detection
03	7	1 = ON 0 = OFF	Invert loop current detection

TONE DETECTION

BSW	Bit	Settings	Description
00	0	1 = OFF 0 = ON	PSTN dialtone detection.
00	1	1 = OFF 0 = ON	PABX dial tone detection.
00	2	1 = OFF 0 = ON	Busy tone detec-TAM mode and during autom. dialling.
00	4	1 = ON 0 = OFF	Country dial tone detection (see NCU#09/0A).
00	5	1 = ON 0 = OFF	International dial tone detection (see NCU#07/08).
00	6	1 = ON 0 = OFF	Detection of dialtone after the country code.
00	7	1 = ON 0 = OFF	Redial only when busy has been detected.
06	3	1 = ON 0 = OFF	Dialtone detection in TAM mode (stops recording when detected).
06	7	1 = ON 0 = OFF	150 Hz dialtone detection.
07	0	1 = OFF 0 = ON	BUSY tone detection before dial (PABX applications)
07	1	1 = OFF 0 = ON	SILENCE detection from EXT.PHONE.
07	4	1 = ON 0 = OFF	FAX AUTOSTART machine detects for CED tone during manual dialling.
12	5	1 = OFF 0 = ON	DTMF detection during ICM record. Can be used to prevent false detections of DTMF-digits during ICM record.
12	6	1 = ON 0 = OFF	Detection of short DTMF tones. Set if there are problems with DTMF detection.
0C	0	1 = OFF 0 = ON	DTMF detection.
0C	4	1 = OFF 0 = ON	DTMF detection during OGM.
0D	5	1 = OFF 0 = ON	PSTN dialtone detection during PABX mode. Set this bit to support PABX systems with no PSTN dialtone.
0E	6	1 = ON 0 = OFF	CNG detection in TAM mode and TEL/FAX mode.
0E	7	1 = ON 0 = OFF	CNG detection in EXT.PHONE mode.
0F	1	1 = ON 0 = OFF	CNG and DTMF detection with parallel phones.

BSW	Bit	Settings	Description
02	0	1 = OFF 0 = ON	Footer printed on received page: date/time, CSI, page number.
02	1	1 = OFF 0 = ON	CSI programming possible for user.
02	2	1 = OFF 0 = ON	PABX setting possible for user.
02	4	1 = OFF 0 = ON	Automatic print out of transmission report after sending.
02	5	1 = OFF 0 = ON	TTI generation on transmitted page (page header).
02	6	1 = OUT 0 = IN	TTI replaces graphic data (in/out positon of page header).
02	7	1 = OFF 0 = ON	Key press acknowledge tone generation.
03	0+1		**Bit 0** / **Bit 1** / **Format date display** 0 / x / Day Month Year 1 / 1 / Month Day Year 1 / 0 / Year Month Day
03	2	1 = ON 0 = OFF	Display format of clock is 12h instead of 24h.
04	3	1 = OFF0 = ON	Possibility to select external phone mode for the user.
04	4	1=digit 0=char	Display format of month
04	5	1 = OFF 0 = ON	Possibility for the user to change the display language.
05	1	1 = OFF 0 = ON	Possibility to set the USAGE CODE for the user.
05	7	1 = OFF 0 = ON	Selection of DTMF code (fax remote start) with user function.
06	0	1 = OFF 0 = ON	Possibility to record a phone conversation.
06	4	1 = OFF 0 = ON	Call monitoring during ICM record.
06	5	1=425Hz 0=700Hz	Frequency of ringback tone.
06	6	1=3sec 0=5sec	Ringback cadence.
07	2	1 = ON 0 = OFF	"TIME STAMP.: ON", shows date and time of call during ICM playback.
07	5	1 = OFF 0 = ON	Possibility to select REMOTE DIAGNOSTIC for the user.
08	1	1 = OFF 0 = ON	1: R key sends time break to the line in PSTN and PABX mode. 0: Unit mutes the handset-microphone if PSTN selected. Press R-Key again to unmute. In PABX time break will be sent to the line.
08	4	1 = ON 0 = OFF	After last unsuccessful redial disable start access to a stored number
08	5	1 = ON 0 = OFF	Beep before OGM2.
08	6	1 = OFF 0 = ON	Possibility for the user to change the SILENCE detection time for ext. mode.
09	2	1 = OFF 0 = ON	Total call blocking (babysitter mode).
09	3	1 = ON 0 = OFF	Possibility to switch the TAM on via remote-control.
0C	5	1 = OFF 0 = ON	Acknowledge beep for each detected DTMF tone (TAM remote control).
0C	7	1 = ON 0 = OFF	The * key must be pressed before entering the access or break through code.
0D	3	1 = ON 0 = OFF	Selective faxreception.
0D	4	1 = ON 0 = OFF	Slow transmission (4800 bps).
0D	6	1=PABX 0=PSTN	Reflects user function 14.
0E	4	1 = ON 0 = OFF	Possible to enter 2 DTMF digits for remote fax start from ext. phone (0-9, *, # are allowed).
10	4+5	1 = ON 0 = OFF	**Bit4:** Beep after successful transmission/reception. **Bit5:** Error tone after unsuccessful transmission/receptions. **Note:** Clear this bits to make a real silent fax reception possible.
10	6	1 = ON 0 = OFF	Redial of '*' and '#' if set. **e.g.:** User dials 1234*56789 via the keypad or via speed/name dial-key: **Bitswitch** / **unit dials** 0 / '1234' 1 / '1234*56789'
12	0	1 = OFF 0 = ON	Possibillity for the user to select 'pulse or tone' dialling.

BSW	Bit	Settings	Description
01	0	1 = ON 0 = OFF	Speaker operation during T30 handshake.
01	1	1 = ON 0 = OFF	Speaker during T30 handshake and V29 operation.
01	2	1 = ON 0 = OFF	DISPLAY of PARAMETERS instead of CSI
		Format:	SSRC **Resolution R:** N(normal), F(fine)
		SS(speed):	96,72,48,24 **C(coding):** H(huffman), R(read)
01	7	1 = ON 0 = OFF	Fax error (LED+message) autoreset after next fax TX.
01	5		Delay before CNG is sent (can be used with BSW 09/4) **BSW 01/5** **BSW 09/4** **CNG delay** 0 0 3s 0 1 0s 1 1 1s
01	3+4		**Bit 3** **Bit 4** **Maximum document length** 0 X 0,6m 1 1 0,8m 1 0 8 minute transmission limit
01	6	1 = ON 0 = OFF	If set to 0, the allowed graphic error failure is handled in %, else in lines.
03	4	1 = ON 0 = OFF	Special FTZ requirements (18TR53) for Germany.
04	0+1		**Bit 0** **Bit 1** **Cable length** (adjust if problems with sending/receiving) 0 0 no 0 1 short (1,8 km) 1 0 medium (3,6 km) 1 1 long (7,2 km)
04	2	1 = ON 0 = OFF	Echo cancelling.
05	0	1 = ON 0 = OFF	Automatic FALL BACK to 9600 bps after a succeeding transmission, if slow transmission was set before.
05	5	1 = OFF 0 = ON	RDS TIMEOUT - RDS access is switched off after 24 h.
05	6	1 = ON 0 = OFF	Automatic TRANSMISSION ERROR TIMEOUT of 30 s
07	6	1 = OFF 0 = ON	Redial attempts in FORWARDING mode.
08	0	1 = ON 0 = OFF	OGM1 DELAY if a single CNG is detected before OGM1 (ext. TAM mode).
08	2	1 = OFF 0 = ON	Sending of NSF **Note:** RDS doesn't work if switched off!
09	0	1 = ON 0 = OFF	External TAM mode; take line immediately after external TAM drops line
09	1	1 = ON 0 = OFF	Display SILENCE VALUES (threshold for NCU#32) during external hone mode. This bitswitch only for debugging.
09	4		Delay before CNG is sent (can be used with BSW 01/5) **BSW 01/5** **BSW 09/4** **CNG delay** 0 0 3s 0 1 0s 1 1 1s
0D	7	1 = ON 0 = OFF	New faxswitch in TAM mode (unit takes the line and checks for CNG tone).
0E	0	1 = ON 0 = OFF	Use parallel phones (if EXT.PHONE is selected).
0E	1	1 = Tx	Receiving speed: 0=9600 bps
			0 = 9600bps 1=4800 bps if SLOW (4800) is set
0E	2	1 = ON 0 = OFF	If set and SLOW (4800) is selected, speed is 2400 bps otherwise it's 4800 bps.
0E	5	1 = ON 0 = OFF	Increases length of reports (**eg:** error,transm.report).
10	3	1 = ON 0 = OFF	RDS function.
11	1	1 = ON 0 = OFF	Adds one CNG to the minimum required CNG's for a specific mode. (The minimum required CNG's are specified by NCU parameter 4F). **Bit =1:** TEL/FAX 2, TAM 3 ... (you can switch between 2 and 3 CNG's) **Bit =0:** TEL/FAX 1, TAM 2 ... (you can switch between 1 and 2 CNG's)
12	3	1 = ON 0 = OFF	With a parallel phone the machine listens on the line via a high impedance to detect CNG/DTMF tones.If this BSW is set, it is possible to switch the unit to the idle mode from the parallel phone by entering '**'.

Note 1: To get the default settings of Bitswitches and NCU parameters, use function 71 (print sytem report). The default values and the actual values are listed with a * indicating modifications.

Note 2: I user forgets his USAGE CODE enter BE8E (B = R-key + 1, E = R-key + 4).

Note 3: If user forgets his ACCESS CODE enter service mode and the old code is not asked for.

6.4.2 NCU parameter listing

The NCU parameters are the 1-byte system parameters that determine the machine's behaviour.
They can be modified with function 74.

The adresses are hexadecimal; all values are decimal.

LOOP CURRENT DETECTION

NCU (HEX)	Unit	Range (DEC)	Description
00	100ms	1-255	If loop current detection is requested and there is no loop current within this time, an error condition occurs.
01	10ms	10-255	The loop current is accepted if it is stable for this time **Attention:** extreme low values can cause problems with ring detection
02	10ms	1-255	Loop current drops within this time are ignored.
55	20ms	0-255	TAM mode: Disconnect iftime of a loop current drop is longer than the value of this parameter.

RING DETECTION

NCU (HEX)	Unit	Range (DEC)	Description
04	10ms	4-255	Ringing signal must be at least off for this time to detect END of ring. Set this value HIGHER than pause time of double rings.
05	10ms	4-255	Ringing signal must be at least on for this time to detect START of ring. Set this value LOWER than the 1st ring-pulse of double rings.
06	100ms	5-255	After this time ring count will be cleared. Set time longer than the max pause between 2 rings.
0C	1s	1-255	Max. wait time for dial tone. If no dialtone is detected within this time, dialling is aborted, Message NO DIALTONE is displayed(min 2 cycles in case of tone cadences).

INPUT/OUTPUT LEVELS

NCU (HEX)	Unit	Range (DEC)	Description
17	1dBm	35-51	Input sensitivity level.
1B	1dBm	0-15	Modem transmit signal output level. Switch the machine off and on after changing the parameter to reinitiallize the modem.
40	1	0-255	Modem correction factor. Reflects settings in service function 65.

SILENCE DETECTION

NCU (HEX)	Unit	Range (DEC)	Description
27	1s	0-255	Silence is detected if the line signal is below the silence detection level (NCU#32) for this duration (TAM mode).
32	1	30-255	Energy level for the TAM/FAX mode which is not allowed to be exceeded to detect silence.
33	1	0-2	Indicates the source of energy detection which should be used for silence detection. This parameter is splitted into internal (TAM-modem path) and external (EXT. PHONE-CNG path) silence index. The 4 lowest bits are used for the nternal and the 4 highest bits for the external silence.
3F	1s	0-255	Silence detection time in EXT TEL mode.
46	1	0-255	Energy level for the EXT PHONE mode which is not allowed to be exceeded to detect silence. The actual value can be monitored with BSW01 bit1.

DIALTONE DETECTION

NCU (HEX)	Unit	Range (DEC)	Description
07/08	2 digits	0-255	The international call sequence can be up to 4 digits long and is packed in 2 bytes, each byte holds 2 digits.Digit "F" indicates the end of the sequence. **Example:** for the sequence "009" set NCU#07 = 00 (000 dec) and NCU#08 = 9F (159 dec).
09/0A	2 digits	0-255	The domestic call sequence can be up to 4 digits long and is packed in 2 bytes, each byte holds 2 digits. Digit "F" indicates the end of the sequence. **Example:** for the sequence "0" set NCU#09 = 0F (015 dec) and NCU#0A = FF (255 dec)
0F/10	100ms	0-255	If PABX/PSTN dialtone detection is disabled (BSW 0 Bit 1/0),the machine waits this time instead of dialtone detection. **NOTE:** A delay of NCU#01 plus 0.65s is added to this value!
11	1	0-255	Maximum number of dialling attempts to a fax number including the initial dial.
12	10s	0-255	Pause time between 2 automatic redial attempts (valid for FAX send and TAM forwarding mode).
35	20ms	0-255	Minimum length of busy tone.
4D/4E	20ms	0-255	On time / pause time of CNG signal.
5C	20ms	0-255	Minimum time for dialtone detection.
5D	200ms	0-255	Minimum time for busytone detection.
3D	1	0-255	Number of rings in TEL/FAX mode.
3E	1	0-255	Number of rings in EXT TEL mode.
49/4A	bits	0-255	Selectale number of rings (0..15) for EXT-Phone. Bitmask; each bit stands for a valid selection in the range from 0/8 to 7/15 rings. **bit -number:** 7 6 5 4 3 2 1 0 **number of rings (Addr. 49):** 7 6 5 4 3 2 1 0 **number of rings (Addr. 4A):** 15 14 13 12 11 10 9 8 **decimal equivalence:** 128 64 32 16 8 4 2 1 **Example:** see NCU#28/29
58	10s	0-255	Maximum lenght of external memo message.
59	10s	0-255	Time when the recording LED should start linking. Approx. 80% of NCU#59.

SERVICE

NCU (HEX)	Unit	Range (DEC)	Description
13	1	1-255	Training repeat count after FTT.
14	1s	0-255	This additional time is added to the standard of 35s wait time for a connect. During a fax call he machine waits the resulting time (35s + NCU#14) for a valid response (CED) before disconnecting.
15	%	0-255	Error limit value in percent (if BSW1/6 = 0).
		lines	Error limit in lines (if BSW1/6 = 1).
16	1ms	0-255	Delay between CFR and message phase.
26	100ms	0-255	Pause between going online and 1st ringback tone.
2B	10ms		Delay between DCS and training.
36	1s	10-255	After this time has passed in TAM remote peration the TAM sends a lot of beeps which means that the user has to prolong the remote TAM operation by pressing any DTMF key.
37	1ms	0-255	Delay between ring detection and sending CED.
42	1	0-255	Default value for the OGM output level.
4F	bits	0-255	Defines the required CNG bursts for each mode. If the corresponding bit is cleared - only 1 (2) CNG is required to switch to fax reception otherwise 2 (3). Bit 0 - reserved Bit 1 - reserved Bit 2 - internal TAM Bit 3 - external TAM Bit 4 - TEL/FAX mode Bit 5 - external mode Bit 6 - reserved Bit 7 - reserved

<table>
<tr><th>NCU (HEX)</th><th>Unit</th><th>Range (DEC)</th><th>Description</th></tr>
<tr><td>0D</td><td>20 ms</td><td>0-254</td><td>PAUSE-Key time. The delay in dialling generated by the REDIAL/PAUSE key (255 = wait for dialtone).</td></tr>
<tr><td>0E</td><td>1s</td><td>1-255</td><td>Total delay time allowed for multible PAUSE-key entries (0 = unlimited).</td></tr>
<tr><td>1F</td><td>1s</td><td>1-255</td><td>Maximum length of OGM1 message.</td></tr>
<tr><td>20</td><td>1s</td><td>1-255</td><td>After this time has passed during OGM1-recording, the LED starts blinking.</td></tr>
<tr><td>21</td><td>1s</td><td>1-255</td><td>Maximum length of OGM2 message.</td></tr>
<tr><td>22</td><td>1s</td><td>1-255</td><td>After this time has passed during OGM2-recording, the LED starts blinking.</td></tr>
<tr><td>23</td><td>1s</td><td>8-15</td><td>Specifies the pause time for TEL/FAX and TAM/FAX mode between two ringback tones.</td></tr>
<tr><td>25</td><td>1s</td><td><NCU#1F</td><td>The minimum time for OGM1, if set to 0 no minimum time is required for a valid OGM1.</td></tr>
<tr><td>28/29</td><td>bits</td><td>0-255</td><td>Selectable number of rings (0..15) for TAM/FAX mode. Bitmask;each bit stands for a valid selection in the range from 0/8 to 7/15 rings.
<table>
<tr><td>bit-number:</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr>
<tr><td>number of rings (Addr.28):</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr>
<tr><td>number of rings (Addr.29):</td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td></tr>
<tr><td>decimal equivalence:</td><td>128</td><td>64</td><td>32</td><td>16</td><td>8</td><td>4</td><td>2</td><td>1</td></tr>
</table>
Example: User should be able to select 5,7 and 9 rings:
NCU#28=160 to set (128+32)/NCU#29 = 2</td></tr>
<tr><td>2A</td><td>1</td><td>1-15</td><td>Number of rings in TAM/FAX mode.</td></tr>
<tr><td>2C</td><td>bits</td><td>1-15</td><td>Selectable RECORD TIME
<table>
<tr><td>possible lenght:</td><td>120s</td><td>60s</td><td>30s</td><td>AUTO</td></tr>
<tr><td>bitnumber:</td><td>3</td><td>2</td><td>1</td><td>0</td></tr>
<tr><td>decimal equivalence:</td><td>8</td><td>4</td><td>2</td><td>1</td></tr>
</table>
Example: User should be able to select 30s and 120s only:
add 2 and 8 for the decimal equivalence of the according times = 010 to set</td></tr>
<tr><td>2D</td><td>1s</td><td>1-255</td><td>Reflects REC time value selected.(user function)</td></tr>
<tr><td>2E</td><td>bits</td><td>0-255</td><td>DTMF code for remote control of the faxswitch. Reflects settings of function 32 (EXT. PHONE) 8 bits for two DTMF characters.
Table:
<table>
<tr><th>digit name</th><th>bitfield</th><th>1. digit</th><th>2. digit</th></tr>
<tr><td>0</td><td>0000</td><td>0</td><td>0</td></tr>
<tr><td>1</td><td>0001</td><td>16</td><td>1</td></tr>
<tr><td>2</td><td>0010</td><td>32</td><td>2</td></tr>
<tr><td>3</td><td>0011</td><td>48</td><td>3</td></tr>
<tr><td>4</td><td>0100</td><td>64</td><td>4</td></tr>
<tr><td>5</td><td>0101</td><td>80</td><td>5</td></tr>
<tr><td>6</td><td>0110</td><td>96</td><td>6</td></tr>
<tr><td>7</td><td>0111</td><td>112</td><td>7</td></tr>
<tr><td>8</td><td>1000</td><td>128</td><td>8</td></tr>
<tr><td>9</td><td>1001</td><td>144</td><td>9</td></tr>
<tr><td>*</td><td>1010</td><td>160</td><td>10</td></tr>
<tr><td>#</td><td>1011</td><td>176</td><td>11</td></tr>
</table>
1. digit (*) 2.digit (5)
e.g.: DTMF code "*5" = 160 + 5 = 165</td></tr>
<tr><td>3C</td><td>bits</td><td>0-255</td><td>Contains all selectable rings in TEL/FAX mode in the form of a itfield. Each bit represents a selectable ring.
Example:
<table>
<tr><th>selectable rings</th><th>value (dec)</th><th>bitfield</th></tr>
<tr><td>no rings selectable</td><td>0</td><td>00000000</td></tr>
<tr><td>0</td><td>1</td><td>00000001</td></tr>
<tr><td>1</td><td>2</td><td>00000010</td></tr>
<tr><td>0,1,2,3,4</td><td>31</td><td>00011111</td></tr>
</table>
If the user selects 0,1,2,3 rings set NCU#3C= 15.
Note: 000 disables the user for this function.
-Time between 2 rings is country dependent (3-5s).
-Too high values may cause problems with silence fax machines.</td></tr>
</table>

III Service

In this Chapter you can find

← illustrated disassembly
← PCB-architecture and descriptions
← troubleshooting
← technical data
← mechanical and electrical parts list
← glossary and index

7 DISASSEMBLY

Warning!
Disconnect the machine from the mains before removing any cover!

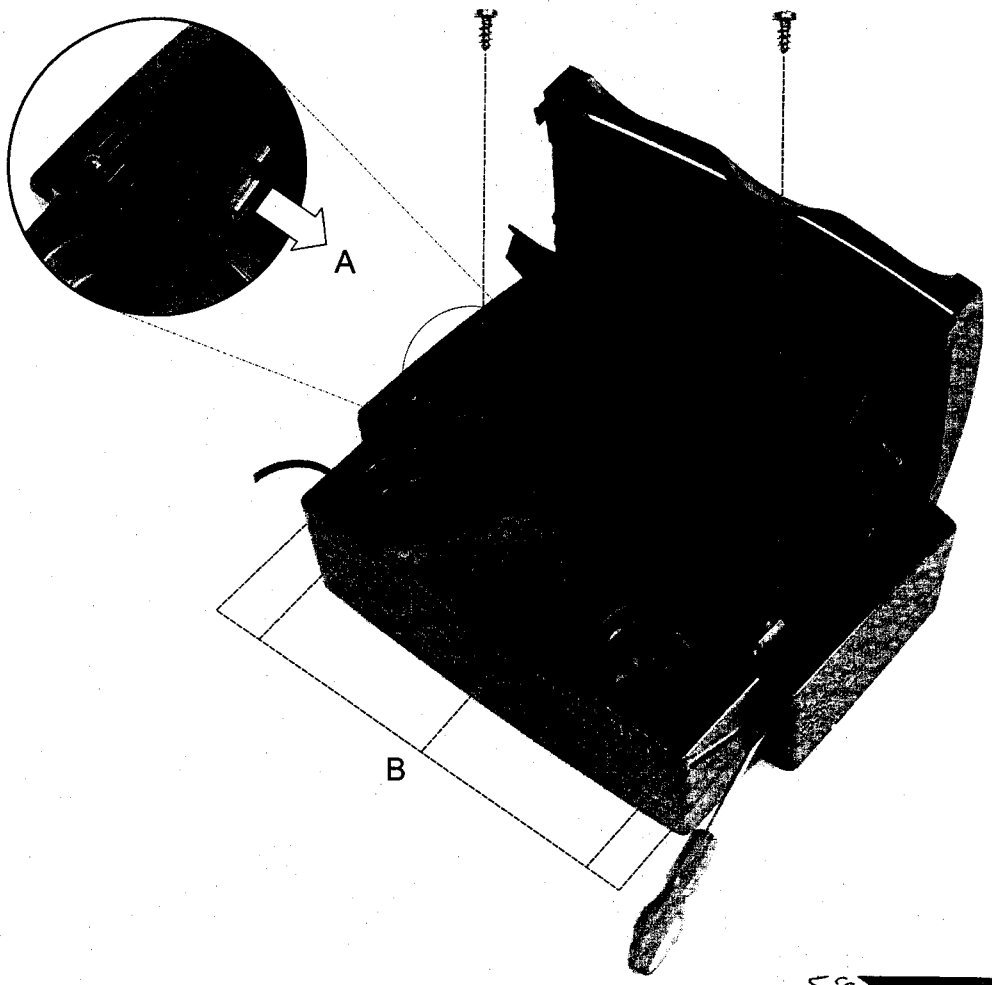
7.1 TOP COVER

7.1.1 Remove top cover

1. Put the handset away
2. Open the front panel and the paperguide
3. Remove the distanceplate as shown in fig.1a (A)
4. Remove the screws as shown in fig.1
5. Push the snapper on the backside inwards as shown in fig.1 (B)
6. Lift up the top cover and pull it forward.
7. Disconnect the cable from the FCU

Screws: 2x torque size 8

Cable: 1x OPU-FCU



7.2 PGU

7.2.1 Remove hookswitch

1. Remove the top cover (see section 8.1.1)
2. Remove the hookswitch

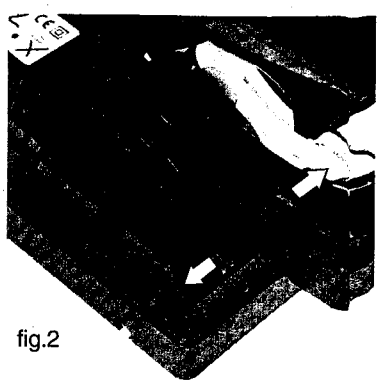
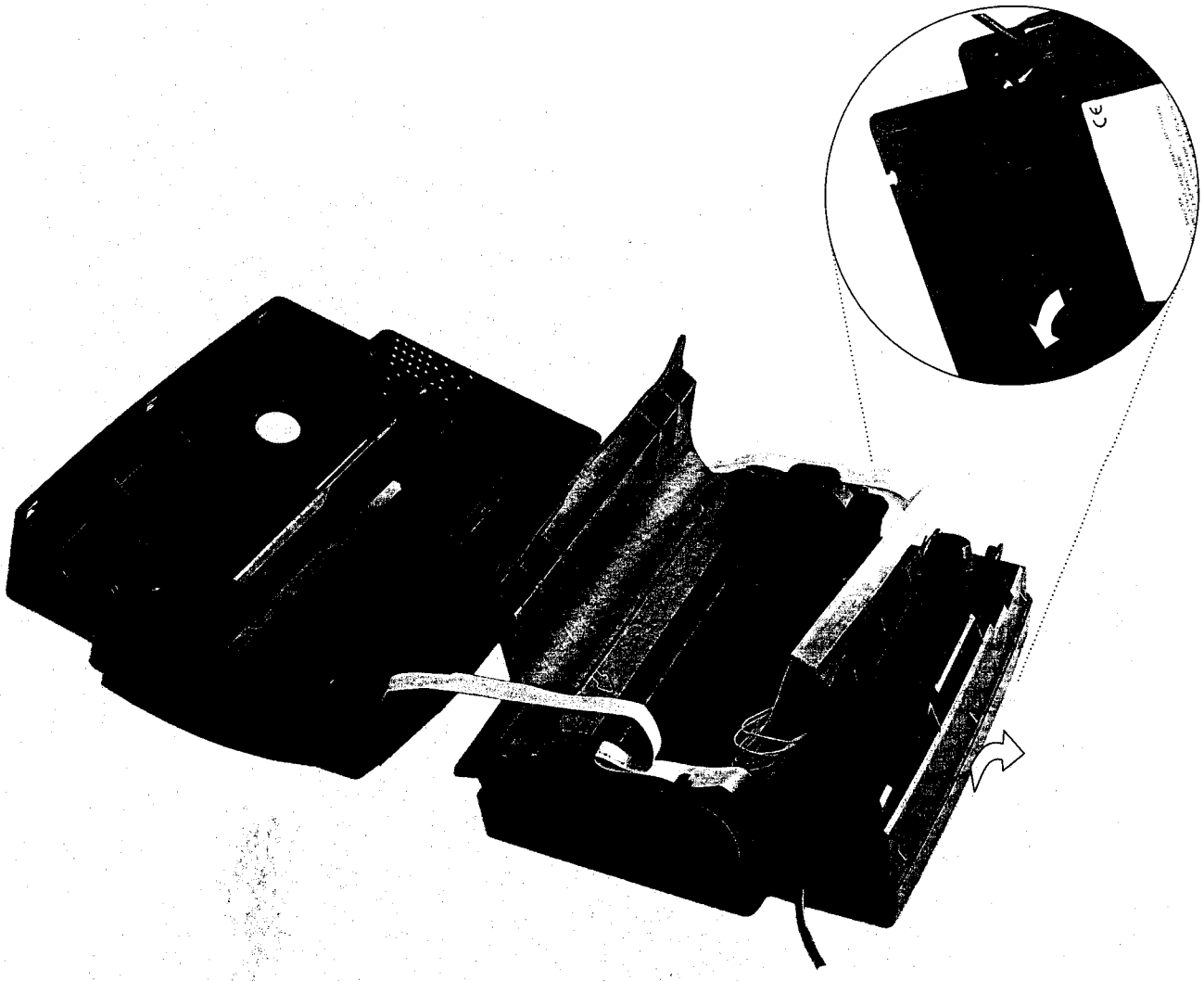


fig.2

7.2.2 Remove PGU

1. Remove the top cover (see section 7.1.1)
2. Disconnect the cable from the FCU
3. Bend out the snapper at the bottom of the machine (fig.3a), and push the PGU to the left side as shown in fig.3

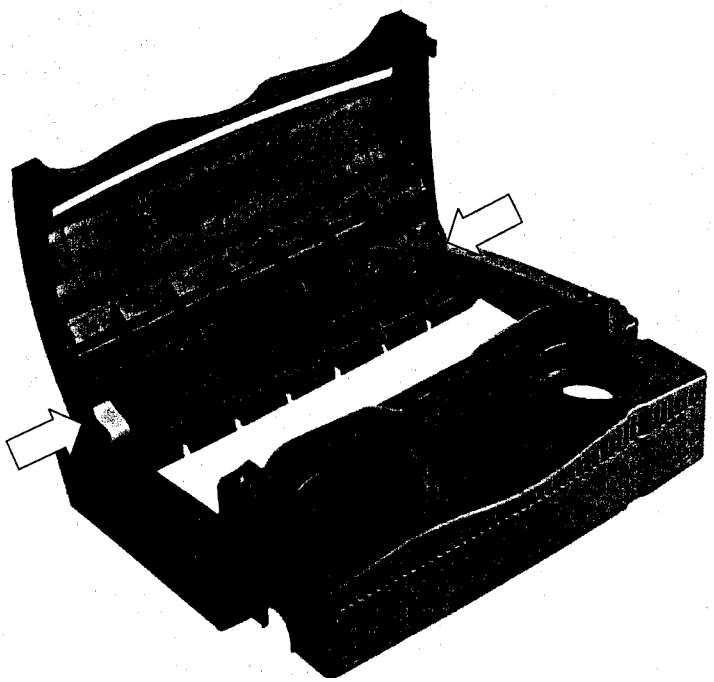
Cable: 1x PGU-FCU



7.3 OPU

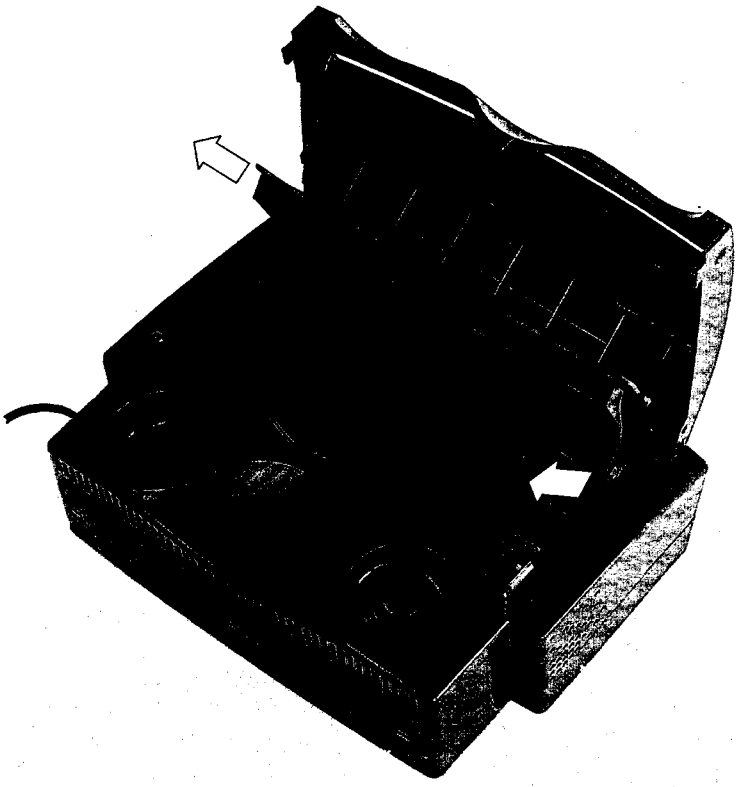
7.3.1 Remove OPU

1. Remove the top cover (see section 8.1.1)
2. Tread out the cable from the top cover
3. Push the snapper inward
4. Remove the OPU



7.3.2 Remove paperguide

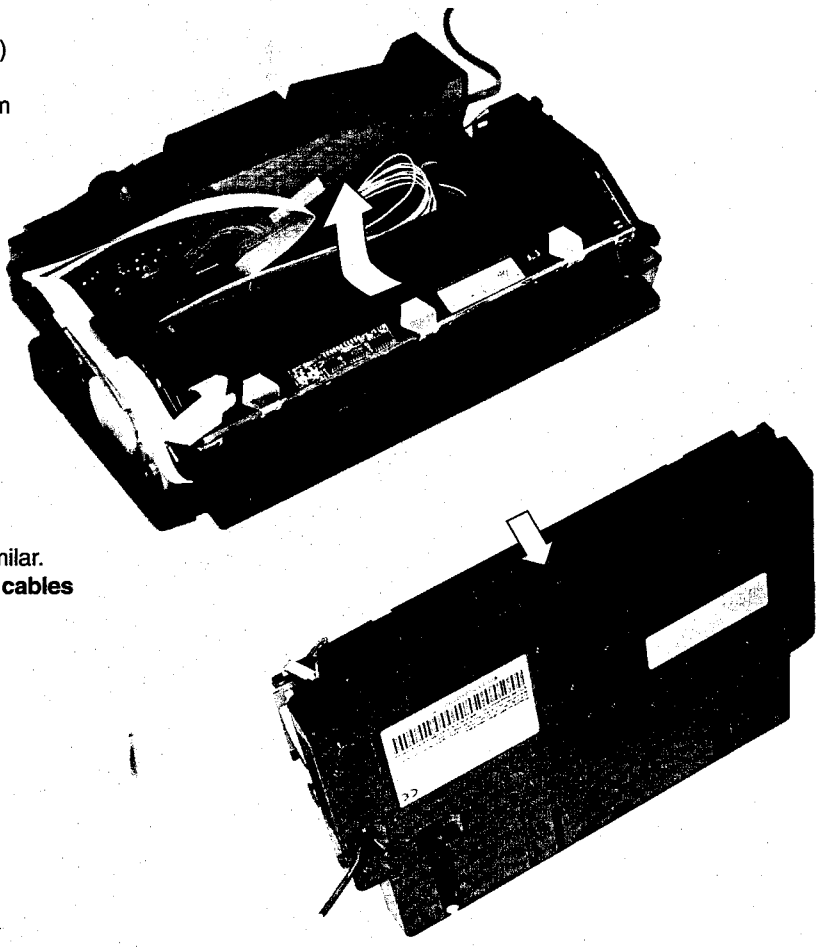
1. Open the front panel and the paperguide
2. Press the paperguide to the left side and push it out along the groove



7.4 MECHANICAL MODULE

7.4.1 Remove mechanical module

1. Remove the top cover (see section 8.1.1)
2. Remove the paperguide (see section 8.4.1)
3. Press the release lever downwards and lift the mechanical module out of the bottom
4. Disconnect the cables from the FCU
   Cables: 2x TPH-FCU / 1x CIS-FCU / 1x SDI/SOP-FCU / 1x RX/TX-FCU



NOTE: The connectors for the TPH-cables are similar.
Before reassemblying, be sure that the cables are properly connected.

White cable to P409
Black cable to P406
(see section 9.1)

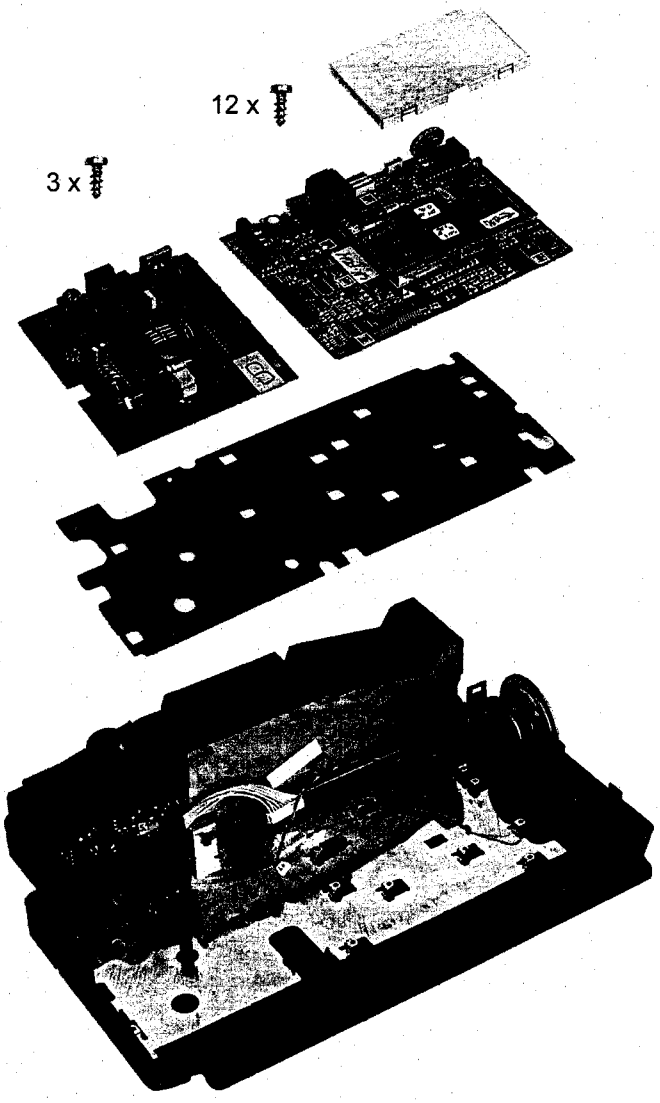
7.5 PCB'S

7.5.1 Remove LIU

1. Remove the mechanical module (see section 8.4.1)
2. Remove the screws and move the LIU out of the bottom — Screws: 3x torque size 8
3. Disconnect the cables — Cables: 1x LIU-FCU, 1x Handset

7.5.2 Remove FCU

1. Remove the mechanical module (see section 8.4.1)
2. Disconnect the cables — Cables: 1x PGU-FCU, 1x LS-FCU
3. Remove the shielding plate from the FCU
4. Remove the screws and move the FCU out of the bottom — Screws: 12x torque size 8
5. Disconnect the cable — Cable: 1x LIU-FCU

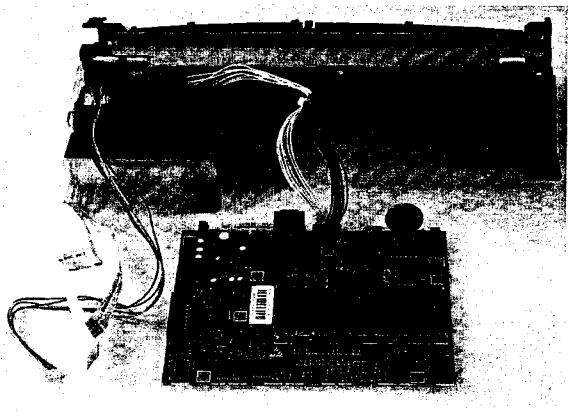


8 ARCHITECTURE

8.1 WIRING

Nr	From	To	Pins
1	LIU	Handset	4
2	CIS	FCU (405)	10
3	SDI / SOP	FCU (471)	3+3
4	PTT	LIU (812)	4 or 6
5	PGU 1*)	LIU (815)	6
6	PGU 2	FCU (401)	10
7	LIU (804)	FCU (404)	19
8	Motor	FCU (408)	5
9	TPH white	FCU (409)	9 or 10**)
10	TPH black	FCU (406)	9
11	OPU	FCU (403)	8
12	LS	FCU (432)	2
13	Power Line	PGU	2

*) Connector Nr. 5 is only connected for Italy in the LIU.
For all other countries there is a parking position available in the isolation plate of the PGU.
**) New cable available for each version.



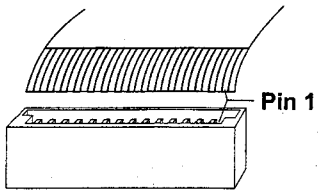
Connection FCU-TPH: P409 can have 9 or 10 pins as well as the TPH.

Make sure that the FCU-TPH cable is always compatible for each version.
Double check P409 and P406 to avoid reverse or weak connections.

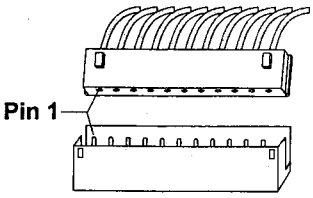
8.2 PIN ASSIGNMENT

8.2.1 Pin description in order

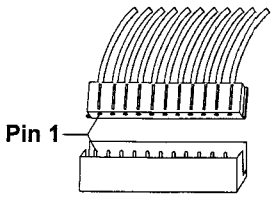
Type 1:



Type 2:



Type 3:



8.2.2 Connectors on the FCU

P401 - Power supply

Pin Nr.:	Assignment	Direction	Type	Description
1	PSAVE	Out	Digital	Power save signal
2	DGND	In	Ground	Hook sensor ground
3	CRADLE	In	Digital	Hook cradle signal
4	PFAIL	In	Digital	Power fail signal
5	VCC	In	Analog	Supply for digital parts and analog parts, TTL... (+5V)
6	DGND	In	Ground	Ground
7	DGND	In	Ground	Ground
8	+24V	In	Analog	Supply for TPH, LED-Bar, Motor, LS-Amplifier...
9	+24V	In	Analog	Supply for TPH, LED-Bar, Motor, LS-Amplifier...
10	-5V	In	Analog	Supply for analog parts (-5V)

P403 - OPU

Pin Nr.:	Assignment	Direction	Type	Description
1	OPUVCC	Out	Analog	+5V (OPU-supply)
2	DGND	Out	Ground	Ground
3	LCDEN	Out	Digital	LCD enable signal
4	OPUSTR	Out	Digital	Strobe signal
5	OPUOD	Out	Digital	Data output signal
6	OPUID	In	Digital	Data input signal
7	DGND	Out	Ground	Ground
8	OPUCLK	Out	Digital	Clock signal

P404 - Modem interface

Pin Nr.:	Assignment	Direction	Type	Description
1	HS2	Out	TTL	Hookswitch in
2	SGP	In	Digital	Gear position sensor
3	MUTE	Out	Digital	mutes AC during DTMF dial
4	PSTN/PABX	Out	Digital	Change AGC for PABX
5	DMO	Out	Digital	Current raise during pulse dial
6	LOOP	In	Digital	High line Voltage (<0,5V)
7	HS1	In	Digital	Hookswitch out
8	PD	Out	Digital	High make
9	HOOK	Out	Digital	High off hook
10	RING	In	Digital	Signal for ringdetection
11	DGND	Out	Ground	Digital ground
12	VCC	Out	Analog	+5V (digital parts)
13	CNG	In	Analog	Detection of signal on a2, b2
14	MTXD	Out	Analog	Modem send
15	MIC	In	Analog	Microphone signal for TAM
16	AGND	Out	Ground	Analog ground
17	MRXD	In	Analog	Modem receive
18	-5V	Out	Analog	-5V (modem interface)
19	VCA	Out	Analog	+5V (modem interface)

P405 - Scanner interface

Pin Nr.:	Assignment	Direction	Type	Description
1	+24V	In	Analog	+24V - LED-bar supply
2	LEDGND	Out	Analog	Switched LED-bar ground
3	SCLK	Out	Digital	Clock signal
4	DGND	Out	Ground	Ground
5	SLSY	Out	Analog	Line synchron signal
6	DGND	Out	Ground	Ground
7	S-5V	Out	Analog	Scanner -5V
8	SVCC	Out	Analog	Scanner +5V
9	DGND	Out	Ground	Ground
10	VIN	In	Analog	Scanner analog data serial in

P406 - Printer interface

Pin Nr.:	Assignment	Direction	Type	Description
1	+24VSW	Out	Analog	+24V switched
2	+24VSW	Out	Analog	+24V switched
3	DI	Out	Digital	Data out signal
4	STB3	Out	Digital	Strobe 3 signal
5	STB4	Out	Digital	Strobe 4 signal
6	VCC	Out	Analog	+5V
7	DGND	Out	Ground	Ground
8	DGND	Out	Ground	Ground
9	DGND	Out	Ground	Ground

P408 - Stepper motor

Pin Nr.:	Assignment	Direction	Type	Description
1	PMPHA	Out	Analog	PHASE1
2	PMPH_A	Out	Analog	PHASE2
3	PMPHB	Out	Analog	PHASE3
4	PMPH_B	Out	Analog	PHASE4
5	+24V	Out	Analog	+24V - Supply for the stepper motor

P409 - Printer interface

Pin Nr.:	Assignment	Direction	Type	Description
1	DGND	Out	Ground	Ground
2	DGND	Out	Ground	Ground
3	THERM	In	Analog	Thermistor for temperature control
4	STB1	Out	Digital	Strobe 1 signal
5	STB2	Out	Digital	Strobe 2 signal
6	LAT	Out	Digital	Data latch signal
7	CLKTPH	Out	Digital	Data clock signal
8	+24VSW	Out	Analog	+24V switched
9	+24VSW	Out	Analog	+24V switched

P432 - Loudspeaker

Pin Nr.:	Assignment	Direction	Type	Description
1	AGND	Out	Ground	Ground
2	LOUD	Out	Analog	Signal for the loudspeaker

P471 - Sensor interface

Pin Nr.:	Assignment	Direction	Type	Description
1	DGND	Out	Ground	Ground
2	VCSDI	Out	Analog	SDI-supply
3	SDI	In	Analog	Sensor signal for doc. in detection
4	SAF	In	Analog	not used
5	DGND	Out	Ground	Ground
6	VCSOP	Out	Analog	SOP-supply
7	SOP	In	Analog	Sensor signal for out of paper detection

8.2.3 External Connectors

P812 - PTT line

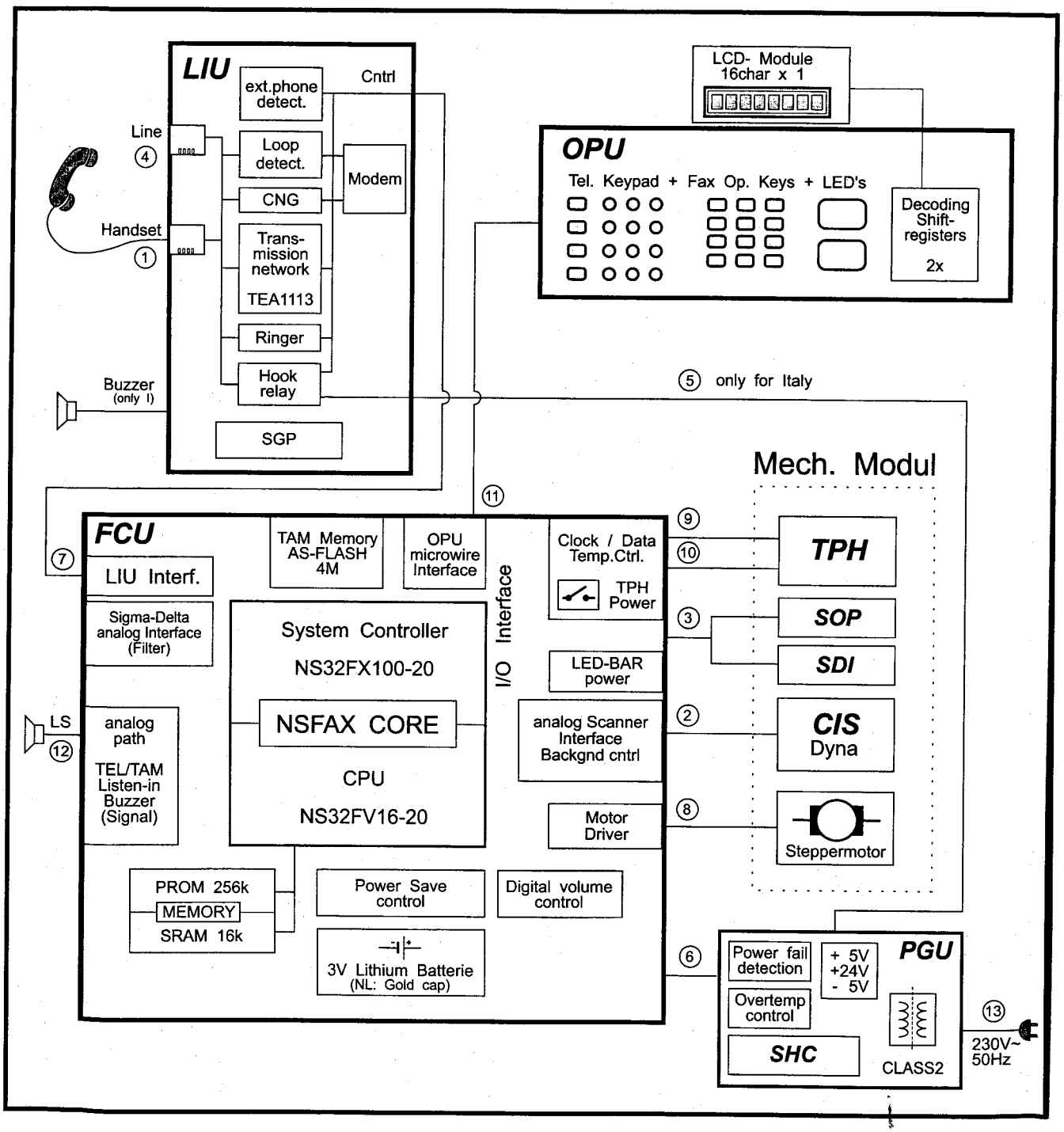
Pin Nr.:	Assignment	Direction	Type	Description
1	NC	-	-	Not connected
2	LA2	Out	Analog	Tel. line out
3	LA	In	Analog	Tel. line in
4	LB	In	Analog	Tel. line in
5	LB2	Out	Analog	Tel. line out
6	ATKL	Out	Analog	Parallel phone (only france)

P813 - Handset

Pin Nr.:	Assignment	Direction	Type	Description
1	MIC-	In	Analog	Mouthpiece microphone
2	EAR-	Out	Analog	Earpiece speaker
3	EAR+	Out	Analog	Earpiece speaker
4	MIC+	In	Analog	Mouthpiece microphone

8.3 BLOCK DIAGRAM

PCB	Consist of	Connected to
FCU (*F*ax *C*ontrol *U*nit)		LIU, OPU, PGU, RX/TX-Motor, CIS, TPH, SOP, SDI, LS
LIU (*L*ine *I*nterface *U*nit)	SGP	FCU, Tel. Line, Handset
PGU (*P*ower *G*eneration *U*nit)	Hookswitch	FCU, mains
OPU (*O*peration *P*anel *U*nit)		FCU

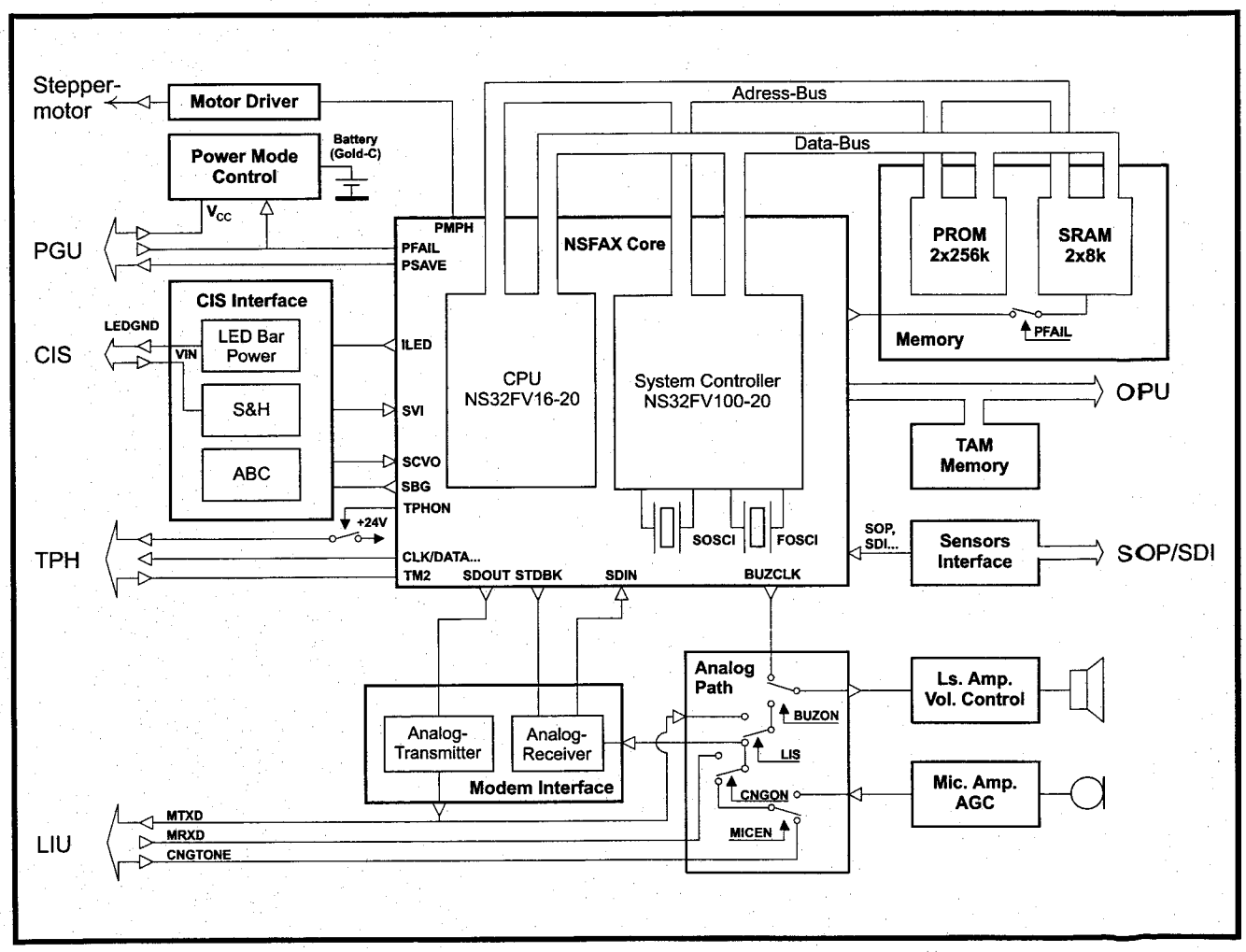


8.4 PCB DESCRIPTION

8.4.1 FCU - Fax control unit

FEATURE LIST

Fax core (CPU + ASIC)
Memory block: PROM (2 x 128k x 8)
SRAM (2 x 8k x 8)
AS-FLASH (4 MBit)
Clock generation
Scanner interface
Thermo print head interface
Stepper motor driver
Interface to LIU and OPU
Cutter interface
Sigma Delta Interface (modem path)
Microphone-AGC, loudspeaker, buzzer elect.
Sensor interfaces
Digital volume control
Power save mode



CONNECTORS

P404	LIU, 19 pin	P401	PGU, 9 pin	P408	Steppermotor, 5 pin
P403	OPU, 8 pin	P406	TPH, 9 pin	P432	Loudspeaker, 2 pin
P405	CIS, 10 pin	P409	TPH, 9 pin	P471	SDI,SOP, 7 pin

POWER SUPPLY

The FCU is powered by the PGU with -5V, +5V and 24V via connector P401 .

KERNEL

The kernel of the system is a two chip solution from Toshiba (3 chips for full duplex hands free funct.) It consists of a CPU and a controller IC (IC300) including DSP for modem functions and a CODEC chip (IC301) for A/D and D/A convertion and the analog front end.

MEMORY

The memory block consists of an OTP - IC302, a SRAMs - IC 303 and a serial -FLASH IC304.The Serial-FLASH is used for speech storage and for page memory Further more usable programable data (names, numbers etc..), are stored in the Serial Flash. In the TAM version, the data is store in an EEPROM.ROM size is twice 128 up to 256x8Kk and a serial Flash with a size of 4Mb. (opt. 8Mb. in one chip) for TAM solution

CLOCK GENERATION

There three oscillators to drive the system The first MODEM Fq. of 20MHz (56.6 kHz for TAM.), the 16Mhz for the CPU and the 32Khz oscillator for the RTC which used for power safe function.

RESET CIRCUIT

The reset circuitry is a resistor and capacitor network.

SCANNER INTERFACE

Consists of an internal and external part. Externallly, the video goes thorugha buffer and filter circuitry (IC350) and kpasses a clamp circuitry (TS352) ti ser DC level to a deined value for each line. Internally is nad additonal clamp and a sample and hold circuitry. Then, the video comes to the A/D converter. For DYNA CIS a 10p FCC cable is implemented. For ROHM CIS a 7p JTS.

PRINTER INTERFACE

The printer interfaceis a standard interface to a thermal printer head. There are only some R-C filters to avoid EMI on the connector. The +24V for the TPH can be switched under software control. For security reasons and AC signal must be applied at the TPHON to switch the voltage on. Any DC level at this pin will switch off the 24V. So in case of a hardware damage of the core the +24V is switch off, which puts the TPH again in a safe aperation mode, even if the strobes of the TPH are still LOW. The AC signal must be in the range 100-800 Hz with a HIGH level time between 50-300us, preferred values are 400Hz and 100us

STEPPER MOTOR INTERFACE

For driving of the stepper motors, a ULN2003 driver IC is used. The driver supports stepper moters with +24V / 200ma max of unipolar type. In the Galileo family, one motor is used for the scanner and the other motor for the printer engine, whereas in SUPERNOVA a one motor concept is implemented

OPU INTERFACE

The OPU is controlled by the FCU by means of a 8 pin connector P403. For POTS Mode functionality, the information of the keyboard is by passed to the LIU with connector P434.

MODEM INTERFACE

The RxD sigdnal is amplified with IC402 before it goes to the CODEC IC301. The TxD signal is AC coupled to the filter path IC402, IC403 (for voice an additional filter is necessary). It is possible to switch different signals to the speake: RxD, TxD and SPKCLK (for key beep) In the other hand, RxD or the microphone signal can be switched to the A/D part of the CODEC:

MICROPHONE AMPLIFIER (G2 ONLY)

For TAM features a microphone amplifier with AGC is implemented. This circuit consists of IC401, TS402 and clue logic. The microphonesignal comes in from the handset and is amplified in the IC to a level of appr. 0dBm. If the level on the output increases above this level, the transistor is conducting and the level of the input signal will be reduced.

LOUDSPEAKER AMPLIFIER

The output amplifier for the loudspeaker is built around IC400 and TS400, TS401. Analog sources for this amplifier are RxD, TxD and the key beep signal. This sources acan be selected under software control with the analog switches IC405, 406. A digital volume control (IC405 and resistors) with 8 steps is used.

POWER SAVE FUNCTION

For the power save mode a maximum of 80mA is allowed on the VCC line. Therefore a switch disconnects different parts of the FCU from VCC in this mode. This switch is realized with TS350 and clue logic.

+24V POWER HIGH SIDE SWITCH

In the facsimile machine, a thermal printhead is used for printing. This device is supplied by 24 Volt and requires 4A max. During no operation-mode the voltage is switched off by a relay via TPHON from the ASIC.

OPU INTERFACE

The OPU is controlled by the FCU. Via the microwire interface, shared with the AS-FLASH and two additional IO's the LCD, key- and LED-matrix will be controlled. The key scanning, LED control, panel identification and sensor handling is realized with shift registers on the OPU.

MODEM INTERFACE

Transmit path:

The serial bitstream signal SDOUT is fed to the analog transmitter including sigma delta interface.
(1bit D/A-converter), RC-link and LPF. The outgoing analog signal MTXD is fed to the LIU and to the analog path.

Receive path:

The signal STDBK is fed to the analog receiver.
The MRXD-analog signal from the LIU pass through the analog receiver including sigma delta interface, amplifier with gain control, integrator, and comparator.
The outgoing PWM-signal (SDIN) is fed to the ASIC.

ANALOG PATH

The analog path consists of 4 digital switches with different jobs:

The 1. switch is controlled by the signal **MICEN** which decides between CNG tone and microphone signal (e.g.: If OGM1 or 2 will be recorded, the MICEN-signal activate the switch).
The 2. switch, controlled by the signal **CNGON** is responsible to listen in for CNG's (e.g.: TEL/FAX-mode or Ext. Phone),
OGM-recording or in the normal operation to forward the MRXD-signal from the LIU.
The output signal is fed to the analog receiver (see receive path).
The 3. switch, controlled by the signal **LIS** select either the MTXD- or the MRXD-signal to make listen in of OGM and ICM possible.
The 4. switch, controlled by the signal **BUZON** is responsible to select between the BUZCLK-signal from the ASIC (Paper out signal...) and the output signal of the 3. switch.
The output is the signal for the loudspeaker.

MICROPHONE-AGC, LOUDSPEAKER

For TAM features a microphone amplifier with AGC is implemented.
The microphone signal is amplified to a level of ~0dBm. If the level on the output increases above this level, a transistor will be driven, which reduces the input signal and the output level will be held constant.
The amplifier for the loudspeaker which is connected to P432 is used to connect under software control analogue signals from different sources (Ringsignal, Keytone,...) to the speaker amplifier.
All signals are switched via analog switches (Analog path).

STEPPER DRIVER

An open collector driver IC is placed on the FCU to drive the RX/TX-motor via PMPH.

SENSOR INTERFACE

SDI:

The document position (in/out) is detected by an optocoupler, via P481 the signal is connected to the FCU.

SOP:

This sensor detects out of paper and is located with an reflexcoupler, via P481 the signal is connected to the FCU.

SGP:

The start position of the gears is detected by a switch which is located on the LIU, via P404 the signal is connected to the FCU.

SHC:

This sensor detects the status of the hook and is located on the PGU, via P401 the signal is connected to the FCU.

DIGITAL RINGER/SPEAKER VOLUME CONTROL

Four volume labels are possible. The keyclicks can be turned on/off.

POWER SAVE MODE

In Power save mode the system clock is divided by 16. The supply for analog parts are turned off (ASIC, CIS, SOP). Only the OPU, parts of the LIU (Loop detect., external phone) and the Document In Sensor are monitored.
In this state the system needs only 2W Power. If a document is placed in, a telephon call arrives, a key is pressed or the handset is liftet the CPU changes the status to normal mode.

8.4.2 LIU - Line interface unit

The LIU is the interface between the FCU and the telephone line.

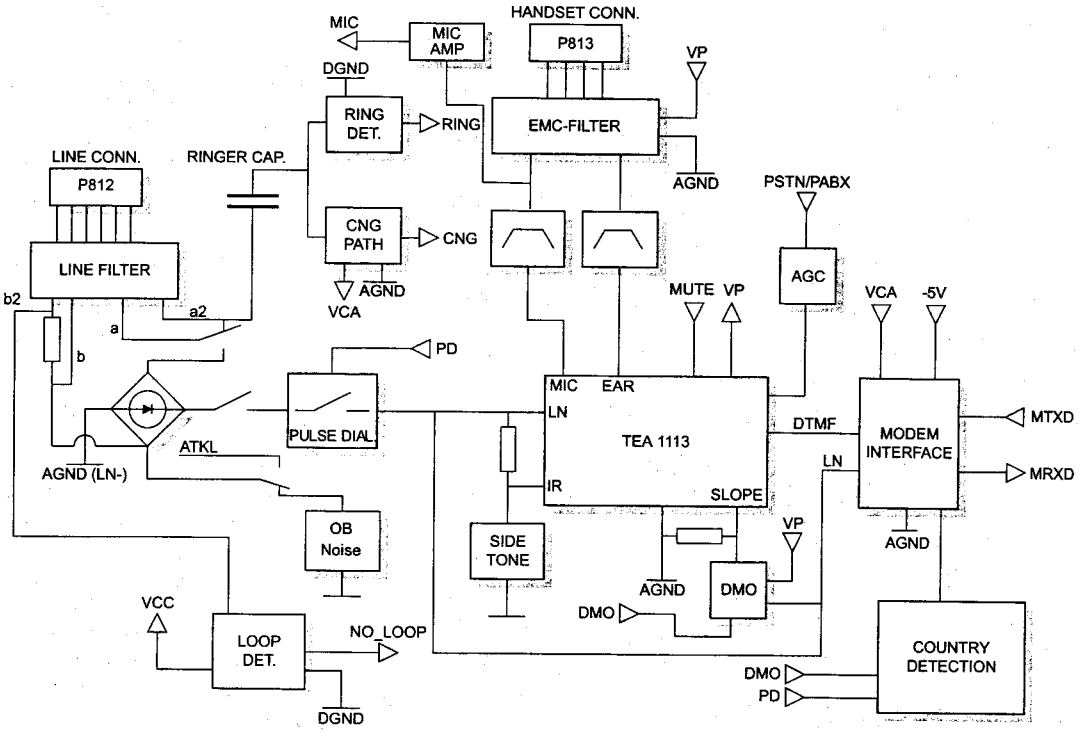
Two different versions of this Line Interface are available:
← without POTS Mode
← with simple POTS Mode: The telephone set works without mains supply, dialling is not possible

The Line interface has to fulfill all PTT requirements for various countries. Some parts of this board are country specific and have to be mounted with different values.

FEATURE LIST

line protection and filtering
loop detection
loop det. of ext. phone (non POTS)
hook switch relais (non POTS)
ring detection
ring generation-buzzer (POTS)
modem interface
external phone detection (non POTS)
country detection
dialling (pulse, DTMF, flash)
corded phone
CNG-detection
POTS-mode (only Italy)

BLOCK DESCRIPTION



CONNECTORS

The LIU provides the following connectors:

P804	FCU Interface
P812	Line Connector
P813	Handset Connector
P815	PGU Hookswitch

CIRCUIT DESCRIPTION

The connection of the PSTN to the unit is done via the connector P812.
In the ON HOOK state the signal is fed from LA/LB via the EMI filter, contacts the hook relay and via the ringer capacitor to the RING DET.
From the hook relay the signal is also fed back to P812 LA2/LB2 (for ext. phone).
In the OFF HOOK state the signal is fed via the EMI filter, the relay, the tax pulse filter (if available), the diode bridge and the pulse dial unit to the Phone Chip (TEA1113) and the modem.

PHONE CHIP (TEA1113)

The phone chip is the Philips Multi-standard Analog Bipolar Speech Transmission Network and is responsible for:

← 2 to 4 - wire interface for the handset.
← Acoustic adjustments like frequency response and level for the transmission and receive part.
← Sidetone compensation adjustment.
← DC characteristic of the phone and the fax and the answering device.
← AC characteristic of the phone, fax and answering device.
← Feeding the DTMF signals which are generated from the FCU board to the line.
← Supply for electret microphone.
← Dynamic limitation in transmit direction.
← Line loss compensation (AGC).

The fax transmit signals are coupled to the line via the DTMF input of the telephone chip, the fax receive signal is directly coupled from the line to the phonechip input LN+ and via wire direct to the modem. Both receive and transmit pass through the modem hybrid circuit that provides frequency response and gain adaptation and is also responsible for the echo cancelling in transmit mode.

RINGER SIGNAL DETECTION

In the On-Hook condition the ringing signal is fed from the connector P812 via the relay, the ring capacitor and the ring detection circuit to the FCU. The processor at the FCU board counts the frequency of the ringing signal and generates a ringing melody via loudspeaker if it is an allowed ringer frequency (country dependend).

CNG PATH

In on hook state CNG signal passes via decoupling (ring) capacitor and CNG PATH (detection) to the FCU.
This means monitoring the line without terminating it with a low impedance.

EXTERNAL PHONE DETECTION

External phone detection is done by a comparator that measures the line voltage. If external phone is connected the line voltage decreases and the logic signal becomes HIGH. On the contrary it's LOW.

LOOP CURRENT DETECTION

Absence of the loop current is detected by a comparator.
If the line voltage is too low the logic signal becomes LOW. On the contrary it's HIGH.

PARALLEL PHONE DETECTION

For parallel telephone detection the line voltage is measured by a comparator, if phone is on line and the interrupter is of. In case of a parallel phone a logic signal is HIGH. On the contrary it's LOW.

COUNTRY DETECTION

Two current sources on the LIU generate country dependent voltages. 6 different voltage levels from -2 to +2 volts are possible for each source. Both voltages are added and can be switched on or off by digital signals.
The resulting DC-signal is measured by the modem ADC. The country code is read out from the LIU.
The software is set to country depending setting.

MICROPHONE PATH FOR OGM RECORDING

For OGM recording the handset microphone signal is fed to the FCU board. The gain will be adjusted by an RC network.

8.4.3 OPU - Operation panel unit

The OPU (Operational Panel Unit) is the human interface to the facsimile machine.
The status is displayed by a LCD and a number of LED's.
A keyboard is provided for operator entry.
There are OPU type keys (such as functions, quick dial etc.) and the standard telephone dialpad (0...9, *, #).
All functions are performed by the core on the main board.
The keyboard status is scanned after an interrupt from the keypad.

KEYBOARD

The keyboard matrix consists of six columns and six rows.
The software debounces the keys and if two keys are pressed ignores this case and treats it as no key pressed.

LCD DISPLAY

A 16 character LCD whith a line of 6 activ icons is used and connected to P602 .
The LCD is configured to 4 bit data transfer.

CONNECTORS

The OPU is connected to the FCU by means of a eight pin connector P667 providing power and the scanning matrix / serial interface.

8.4.4 PGU - Power generation unit

The PGU is a switched mode power supply, working as a flyback converter with a secondary buck converter.
The PGU components are mounted on two single-layer PCB of V0 material: The main pcb with the on/off line switcher, the powerfail circuit and the sub pcb with the secondary DC/DC converter.
For the use of a cheaper and less polluting plastic material of the whole fax machine, the PGU has to be built in a seperate fire protective part of the housing (EN60950).

FEATURE LIST:

+24V (printhead, stepper motor, scanner illumination)
+ 5V (digital circuits, sensors, modem, analog circuits, scanner)
- 5V (analog circuits, scanner)
Power fail signal (if 24V drops)
Cradle signal (on/off hook)

CIRCUIT DESCRIPTION

The input voltage is 195...264VAC; the output voltages are +24.3VDC/0...3A (4A peak), +5VDC/340mA and -5VDC/23mA in the normal operating mode. In the power save mode the 24,3V is loaded with 6mA, the -5V is loaded with 21mA and the +5V is loaded with 70mA.
The SMPS is short-circuit and open-circuit proof and it has an additional thermal protection.
Because the secondary outputs are on TNV potential, the PGU has to withstand 3kVAC and has to be double insulated.

PROTECTION CIRCUITS

Overcurrent Protection
The controller monitors the primary current by measuring the voltage. If the current is more than the limit (approx. 3A transformer primary current), a transistor is switched off immediately.

Overvoltage Protection
If the regulation loop fails or the secondary circuit has any interruption the output voltage and the primary auxiliary voltage begin to rise. To avoid major damage of SMPS and load, a zener diode starts conducting if the auxiliary voltage rises above 18V. This switches on a transistor which pulls down the compensation input of the switching controller. This way the ON time of the switching transistor is reduced, so that the auxiliary voltage and the transformer-coupled output voltages cannot rise any longer.

Overtemperature Protection
If the heatsink temperature rises above 70°C, a NTC resistor gets lower in resistance. A transistor is switched on and pulls down the compensation input of the switching controller. This way the ON time of the switching transistor is reduced, so the transferred power is limited and the temperature cannot rise any longer.

Power-save Mode
To ensure a power consumption of the FAX machine of less than 2W in the standby-mode, the SMPS has to change from the continuous operating mode to a so called 'burst-mode'.
In this mode current is transferred only for a few cycles, then there is a longer pause to reduce the switching losses. That's possible because only the +5V and -5V is loaded by a reduced current in the standby-mode.
But this 'burst-mode' causes a relatively high ripple voltage on the secondary outputs.
To keep the +5V output within tolerance, a secondary buck-converter is used.

Undervoltage detection
This circuit monitors the +24V supply voltage and generates an active low open collector power-fail signal, if the supply goes down. This PFAIL signal is connected to the FCU and forces the CPU to go to the power-save mode. "Power-fail" is detected, if the +24V output drops to 11V.
The PFAIL signal goes low about 2 ms (at typical load) before VCC falls out of tolerance.

AC INPUT CONDITIONS

Phase:		**single**
Input voltage:	rated: range:	230 VAC 195 ... 264 VAC
Frequency:	rated: range:	50 Hz 47 ... 53 Hz
Power save mode:		typ. 2W at 230VAC
Dip protection:		10ms at 230VAC IEC 1000-4-11 (+24V/1,5A +5V/350mA -5V/33mA)
Reversion:		automatically

DC OUTPUT CHARACTERISTICS (OPERATION MODE)

Voltage	**Ripple voltage**	**Current**
+24,3VDC + 0,4V/-0,5V (0-800mA)	max. 2Vpp (20MHz bandwith) max. 0,6Vpp at changing load (0,3-4A, 100Hz, duty cycle 10%)	
+5VDC ±5%	50mV rms (200Hz-10kHz)	typ. 350mA max. 500mA
-5VDC ±5%	50mV rms (200Hz-10kHz)	typ. 23mA max. 50mA

DC OUTPUT CHARACTERISTICS (POWER-SAVE MODE)

Voltage	Ripple voltage	Current
+24,3VDC ±0.5V	6Vpp max.	typ. 6mA max. 15mA
+5VDC ±10%	50mV rms (200Hz-100kHz)	typ. 70mA max. 120mA
-5VDC +10%/-20%	50mV rms (200Hz-100kHz)	typ. 21mA max. 40mA

OUTPUT PROTECTIONS

Overcurrent:	max. 10ADC (+24V) max. 1ADC (+5V) max. 250mA (-5V)
Reversion:	automatically
Overvoltage:	max. 35V (+24V)
Reversion:	restart

POWER FAIL SIGNAL GENERATION: MONITORS THE 24V OUTPUT

Output:	active low, open collector, 10mA sinking capability (5V)
Threshold:	11VDC ±0,5V
Hysteresis:	0,5V
Condition:	+5V within tolerance for 2msec min. after PFAIL goes active

EMI

Conducted:	regulation -6dB (all loads) (according to EN 55022/class B)
Radiation:	regulation -6dB (all loads) (according to EN 55022/class B) an additional filter on the mains inlet is required to prevent from radiation of FCU generated RF-noise

SAFETY REQUIREMENTS:

EN 60950 class II equipment including NORDIC exceptions

High-pot test **Input to output:**	3kVAC for 1sec (<10mA)
Insulation resistance:	>10MOhm 500VDC
Housing:	in accordance to EN 60950/4.4.6 (five enclosure)
Output:	in accordance to EN 60950/2.11 (limited power source)

RELIABILITY:

MTBF at standby:	1 000 000 hrs (power save mode <2W)

CONNECTORS AND CABLES

Input:	direct soldered mains cable with EURO-plug and strain relief at the right side of the PGU-housing (1800 mm ±20mm)
Output:	cable with 10-pin AMP-CT connector (130 mm ±5mm)

9 TROUBLE SHOOTING

9.1 SERVICE REPORT

The service report (function 72) is a listing of the most recent (10) error codes and gives information of the (5) most recent communications that experienced errors.
The Error code column indicates communication errors (see section 10.2).

1. Enter the service function (see section 7.3).
2. Press ENTER - The Service report list will be printed now.

SERVICE REPORT

TIME	ERR.CODE	REMOTE MACHINE	TX/RX	PAGES	SP	RESOL.	CODING
	04		R	0			
	04		R	0			
	42						
	04		R	0			
	40	4316010112345	R	1	96	STANDARD	MR
	31	4316010112345	R	2	96	STANDARD	MR
	40						
	06	4875	T	1	96	STANDARD	MR
	04		R	0			
	06	4316010154321	T	1	96	STANDARD	MR
	42						
	06	4316010112345	R	2	96	FINE	MR
	06	4172	T	0			

Position	Description
TIME	Date and time
ERR.CODE	see section 10.2
REMOTE MACHINE	CSI or if CSI not available the called telephone number
TX/RX	T = transmit, R = receive
PAGES	Number of pages transferred if any pixel transmission occured
SP	Transmission speed (9600, 7200, 4800 or 2400 bps)
RESOL.	Resolution (standard/fine/photo)
CODING	MR or MH

9.2 ERROR CODES

Nr.	Error message	Description	Action
01	PICT. QUALITY	The transmitted or received picture quality was unacceptable	Check line connection. The other machine can be uncompatible. Send to another machine. Adjust output level. Switch on echo cancelling BSW 04
02	TIME OUT	The remote machine gave no answer within the specified time	Check line connection. The other machine can be uncompatible. Send to another machine. Adjust output level.
03	DCN RECEIVED	The remote machine terminated the communication. Possibly TX rejected.	Other machine is out of paper, has a paper jam or STOP was pressed during the transaction.
04	LINE DISCONNECT	An expected command has not been received. Possibly the line was disconnected	Check line connection. The other machine can be uncompatible. Send to another machine. Adjust output level.
05	NO RESPONSE IN ALL TRIES	The receiver did not reply the third training signal or the pixel message (receive quality unknown)	Check line connection. The other machine can be uncompatible. Send to another machine.Adjust output level. Exchange FCU - LIU

Nr.	Error message	Description	Action
06	ABORTED	The TX was aborted through the STOP key or by irregular circumstances	Info only
08	3 ID RECEIVED WHILE WAITING FOR CFR	The remote receiver did not understand our answer to its ID	Check line connection. The other machine can be uncompatible. Send to another machine.Adjust output level. Exchange FCU - LIU
09	FALL BACK IMPOSSIBLE	It was not possible to send or received an acceptable training signal	Check line connection. The other machine can be uncompatible. Send to another machine.Adjust output level. Exchange FCU - LIU
10	ABSOLUTELY NO LOCAL RESPONSE FROM REMOTE INTERRUPT	The remote machine issued a voice request, but the local operator did not respond	Check SW settings, try to send to another machine. Adjust out put level and/or sensitivity
11	LINE BUSY	Busy tone detected during fax communication	Control the line. For PABX operations, check fax settings.
12	INVALID DCS	The parameter set to the remote transmitter does not correspond to our capabilities	Check SW settings, try to send to another machine. Adjust out put level and/or sensitivity
13	IRRELEVANT RESPONSE	The called machine responded with a wrong frame (T30 violated)	Check SW settings, try to send to another machine. Adjust out put level and/or sensitivity
15	INCOMPATIBLE REMOTE TRANSMITTER	It is no possible to find a common parameter set with the remote transmitter	The other machine can be uncompatible. Send to another machine.Adjust output level. Control settings at remote machine
16	ERROR CODE TRANSMITTED		only info
20	NO DOCS TO BE POLLED	The receiving machine did not reply to the polling comand	The other machine can be uncompatible. Poll from another machine.Adjust output level. Switch on echo cancelling BSW 05. Control settings at both ends.
21	POLLING PASSWORD INCORRECT	Password given incorrect. Polling not possible.	Control code settings at both ends. Try to poll from another machine. Replace FCU - LIU
22	INCOMPATIBLE REMOTE RECEIVER	Is not poosible to find a common parameter set with the remote receiver	The other machine may be uncompatible. Control code settings at both ends. Try to send to another machine.
23	SPEED MISMATCH	The remote transmitter returned in DCS a higher scan speed then the default DIS setting	The other machine may be uncompatible. Control code settings at both ends. Try to send to another machine.
24	LINE TIME OUT IN PICTURE	A picture line has not been received completly within 5 secs	The other machine may be uncompatible. Check line connection Try to send to another machine.
25	NO CONT. WITH NEXT MESSAGE	The remote transmiter returned end of message or connection terminated	Check for local document jam. The other machine can be out of paper. Check line connection. Send to another machine. Check Sensor DI
26	NO POST MSG OR LOCAL INTERRUPT AT STATE F	Voice request was not acknowledged	The other machine may be uncompatible. Check line connection Try to send to another machine. Adjust output level. Exchange FCU -LIU
27	PHONE DISCONNECT	Connection terminated during voice request	Posibly the line was disconnected.
29	INTERNAL ERROR	Local malfunction during transaction	Check normal functions (copy, print report...). Try to send to another machine. Replace FCU

Nr.	Error message	Description	Action
30	ILEGAL ACTIVATION		Info only
31	COVER OPEN DETECTED	The paper cover was opened.	Check cover. Check size of paper roll. Check internal connections. Replace sensor. Replace FCU
32	COMMUNICATION PROBLEM	Communication error which cannot be define with any other error code.	Check settings at both ends. Check line connection. The other machine can be uncompatible or defect. Try to receive and send from another machine
33	COMMUNICATION TIME OUT	The receiver does not reply within the specified time.	The other machine may be uncompatible. Check line connection Try to send to another machine. Adjust output level. Exchange FCU -LIU
34	REMOTE REJECTED	Unauthorized caller was rejected	Information only
40	PAPER OUT	No paper detected	Check paper roll, check or replace paper sensor. Check internal connections. Replace FCU
41	DOCUMENT JAM	Document was longer than specified. (see BSW01 bit 3/4)	Check or replace the document sensor (SDI). Check scanner motor, check inter. connections. Replace FCU
42	POWER OFF	The power was switch off	Information only
43	POWER ON	The power was switch on (only if backup battery available)	Information only
44	TIME SET	System timer has been set by user	Information only
45	PRINT OVERHEAT	Thermal Print Head overheat was detected	Check FCU and Mechanical Module. Replace.
46	BUSY DETECT	The tone detection detected a valid busy tone sequence and the vp_handlerissued an EV_disconnect event. Only valid if bitswitch 11/0 set	For PABX applications, check installation parameters. Check line connections.
47	SIL DETECT	The tone detection detected a valid silence period and the vp_handler issued an EV_VOX event. Only valid if BSW 11/0 set.	Check line connections. Check internal connections. Replace FCU -LIU
48	No. OF RETURN CODES		Info only
49	CNG DETECTED	The tone detection detected a valid CNG sequence and the vp_handler issued and EV_CNG event. Only if BSW 11/0 is set .	The other machine can be uncompatible. Try to send to another machines. Replace FCU
50	DUR DETECTED	The tone detection detected a valid dration tone (with an undefined frequency but with a defined length) sequence and the vp- handler issued and EV -DISCONNECT event. Only if BSW 11/0 is set .	Check line connections. Try to send to another machine. Check internal connections. Replace FCU -LIU
51	DIAL DETECTED	The tone detection detected a valid dration tone sequenceand the vp_ handler issued and EV -DISCONNECT event. Only if BSW 11/0 is set .	Check line connections. Try to send to another machine. Check internal connections. Replace FCU -LIU

Nr.	Error message	Description	Action
52	DROP DETECTED	The loop current detection (a part of the tone detection) detected a loop current drop. An EV- DISCONNECT event will be issued. Please note that this special loop current detection works only during TAM mode. Only valid in BSW 11/0 set	Check line connections. Check internal setetings. Replace FCU -LIU
53	DTMF EXT	Ext. Tel DTMF detection detected a valid DTMF secuence (e.g, *5) and switch to fax reception	Check setting for ext. remote. (*5, *4 etc.). Try other external device. Change FCU.
54	FLASH COMMON ERROR	Communication error with the Flash Memory driver	Machine on-off. Reset. Replace FCU
55	FLASH DATA ERROR	Data errror at writting to Flash Memory	Machine on-off. Reset. Replace FCU

9.3 ERROR MESSAGES

Error message	Reason	Action
NO DIALTONE	Machine can not detect the dialtone.	Try ONHOOK dialling to determine which dialtone can not be detected. Check PABX/PSTN setting. Switch off dialtone detection (see BSW 00/6).
NO LOOP CURRENT	No loop current detected.	Check line cable. Check LIU connectors. Switch off loop current detection (see BSW 00/3). Check correct OTPROM settings. Replace LIU.
NO CONNECTION	Other party is either busy or does not reply.	Check with manual dialing.
REDIAL FAILED	No connection after 3 attempts.	Check with manual dialing. Try calling later.
TRANSMISSION ERROR	Too many errors during transmission.	Check the line connection. The other machine may be defect or incompatible, try sending to another machine. Adjust output level. Set BSW04 (cable length). Switch on echo cancelling (BSW04). Switch on error autoreset (BSW01).
OUT OF PAPER	End mark of thermal paper detected.	Replace paper. Clean sensor. Replace paper end sensor or FCU.
DOCUMENT JAM	Document is longer than 600/800cm or causes a document jam.	Set the max Document length (BSW1 Bit 3/4).

9.4 PROBLEM LIST

Description	Reason	Action
After plugin of the mains cable,	1. The power supply is OK.	1. Check the panel cable for damages and
1. The machine reacts with a audible gear movement but LCD and keypads are dead.	The panel cable is damaged or not correct plugged. Panel or panel driver is defect.	control the plug (P403) for correct seat. Measure on P403 between: pin 2 and 1 = 5 V DC pin 2 and 8 = clock signal If there is a fault exchange the FCU otherwise exchange the OPU.
2. The machine reacts not at all.	2. All voltages missing or there is a defective on the FCU.	2. Check the mains cable for damages. Measure on P401 between: pin 6-7 and 8-9 = 24 V DC pin 6-7 and 10 = -5 V DC pin 6-7 and 5 = 5 V DC If no voltages are recognizeable exchange the PGU otherwise exchange the FCU.
There are no faults in the scanning path (The quality of a sended document is OK) but the copy quality and the printer test pattern are bad.	There is a damage in the printing path. A damaged semiconductor on the FCU cannot be excluded.	Check all TPH cables for damages. Control the plugs P409, P406 for correct seat. During printing measure on P409 between: pin 1 and 9 = 24 V DC pin 1 and 4,5,7 = strobes clear visibl. If no signals are recognizeable, try to exchange FCU otherwise exchange mechanical module.

Description	Reason	Action
There are no faults in the printing path because printouts of received fax messages and printer test pattern are OK but printouts made in copymode are not.	A damaged semiconductor on the FCU cannot be excluded.	1. Check connection between FCU and CIS. Measure on P405 between: pin 4 and 1 = 24V DC pin 4 and 7 = - 5V DC pin 4 and 8 = 5V DC pin 4 and 3 = clock
1. White or black copies	1. Failed connection between FCU and CIS. Defective CIS, cables or FCU.	If no signals are recognizeable, try to exchange FCU otherwise exchange mechanical module.
2. Vertical black lines on the copy, uneven density, blurred or filled-in characters	2. Dirty CIS or roller.	2. if there are sharp peaks or dropouts in the CIS waveform (function 67) clean CIS and roller otherwise exchange mechanical module.
The machine works, but no telephone conversation, sending and receiving is possible.	There is a defect in the line interface unit. It is also possible a fault on the FCU (modem, filtering a.s.o.).	Check tel. line and plug P812 as well as handset cord and P813, inspect also P404. Measure on P404 between: pin 11 and 12 = 5 V DC pin 11 and 18 = -5 V DC pin 11 and 19 = 5 V DC Before exchanging LIU inspect the voltages on P401.
1. General dialing does not work.	1. There is a fault on LIU or FCU because the FCU generates the dialing signal and the LIU is dialing.	1. Check cable between P404 and 804. Check all voltages Exchange LIU.
2. Dialing without Power does not work.	2. In the most countries dialling without power supply is not provided (except UK and I).	2. Only in UK and I dialling without connection to mains is working. Otherwise exchange the LIU.
The device works but it is not possible to receive, send or copy because the stepper motor does not work.	Stepper motor or a driver on the FCU is defective, or a blocked gear may be the reason.	Control the gear, if there is a rest of paper in the mechanical modul then clean it. Measure on P408 (during printing or scanning routine) between: pin 5 and 4 = rectangle signal pin 5 and 3 = rectangle signal pin 5 and 2 = rectangle signal pin 5 and 1 = rectangle signal pin 5 and DGND = 24 V DC (open collector driver !!!) If the signals are OK exchange the stepper motor otherwise the FCU.
During conversation from an ext. phone, the machine switches to fax reception.	You have paused too long during conversation.	Increase silence detection time or switch it off. (NCU#3F)
The machine cannot recognize a document or the end of a document. („endless" paper transport)	The SDI is mechanical blocked or it is not possible for the FCU to inquire it.	Check the sensor lever and the cable between sensor and FCU. Measure P471 between: pin 1 and 2 = 5 V DC pin 1 and 3 = sensor signal. Exchange mechanical modul.
The machine can not recognize the thermal paper or the end of the thermal paper.	The sensor SOP (sensor out of paper) is dirty or it is not possible for the FCU to inquire it.	Clean the sensor and check the cable between sensor and FCU. Measure P471 between: pin 1 and 6 = 5 V DC pin 1 and 7 = sensor signal Exchange mechanical modul.
Double ringer. Machine detects each part of the ringing signal. eg.:fax counts 1 2 3 4 5 6 should be 1 2 3	Ring count which can be adjusted by the user is not correct. eg.: ring count setting: 3 rings but machine rings 6 times.	Set NCU 04 to 100.
No connection within a PABX.	TIME/EARTH-Break setting is not correct.	Check the setting in function 14.
When a number was dialed from an ext. phone, the machine goes on line.	It is possible if the ext. phone works with pulse dial that a device which is connected to the same telephone plug rings, too. The machine interprets this as an incoming ring and goes on line.	Set NCU 05 to 010
No regular operation with ext. TAM.	Wrong priority in the telephone line or wrong ring count setting.	The fax must have first priority in the telephone line. Set the ring count of the fax higher than the ring count of the ext. TAM.
External devices don't work.	Check setting (Function 33). Inspect connection between line and external devices.	Set external phone (Function 33).
User has forgotten the USAGE CODE.		Enter BE8E (Function 17: Usage code) B= R-key+1, E= R-key+4

10 TECHNICAL DATA

10.1 SPECIFICATION

10.1.1 General specifications

Items	Specification
Type	Desk-top type, transceiver (Half duplex)
Telephone circuit	PSTN with most common PABX
Input document size	1. Width: 148 - 217mm 2. Length: 105 - 600mm 3. Thickness: 0,05 - 0,15mm
Scanning method	Contact Image Sensor (CIS)
Printing method	Thermal printing
Recording paper	1. 210 mm x 30 m - with paper adjustment part 2. 216 mm x 30 m roll diameter < 53 mm
Recording paper feed	Manual paper feed

10.1.2 Communication quality

Items	Specification
Maximum time/line	TX 10ms/line RX standard: 20 ms/line detail: 10 ms/line
Protocol	ITU T30 binary
Date compression method	MH, MR coding
Modulation method	1. Message: V29, V27ter 2. Protocol: V21
Data transmission speed	9600 / 7200 / 4800 / 2400 bps, automatic shift down
Sequence of protocol signal	NSF —> CSI —> DIS
Transmission time	Chart: ITU #1 Resolution: Standard Bit rate: 9600 bps Protocol time: excluded
Protocol time	Conforms to ITU T30 standard, T30 new

10.1.3 Scanning quality

Items	Specification
Max. scanning width	216mm ± 1mm
Valid scanning width	210mm ± 1mm
Scanning length	Depends on document length, max. 600mm **Invalid scanning area** top of page: max. 4.0mm bottom margin: max. 4mm
Threshold level	dynamically controlled with ABC
Resolution 1. Main scanning 2. Sub scanning	8 pels / mm 1. Standard: 3.85 lines / mm 2. Detail: 7.7 lines / mm
Colour response	**1. To read colour chart** a) 80% blue 100% of the area b) 80% red 100% of the area c) 80% violet 100% of the area d) 100% green 100% of the area **2. Not to read colour chart** (Drop out colour) a) yellow 100% b) PM-J 100%

10.1.4 Printing quality

Items	Specification
Thermal paper width	216mm ± 1mm
Valid printing width	210mm min.
Printing length	Depends on document length and density
Paper replace indication	flashing LED, error tone is generated (1 sec), display message (if available)

10.1.5 Copy quality

Items	Specification
Background density	Less than 0.12
Uneven density	Less than 0,3 (Macbeth densitymeter)
Reduction and enlargement	Main scanning: 1±1% Sub scanning: 1±2%

10.1.6 Other features

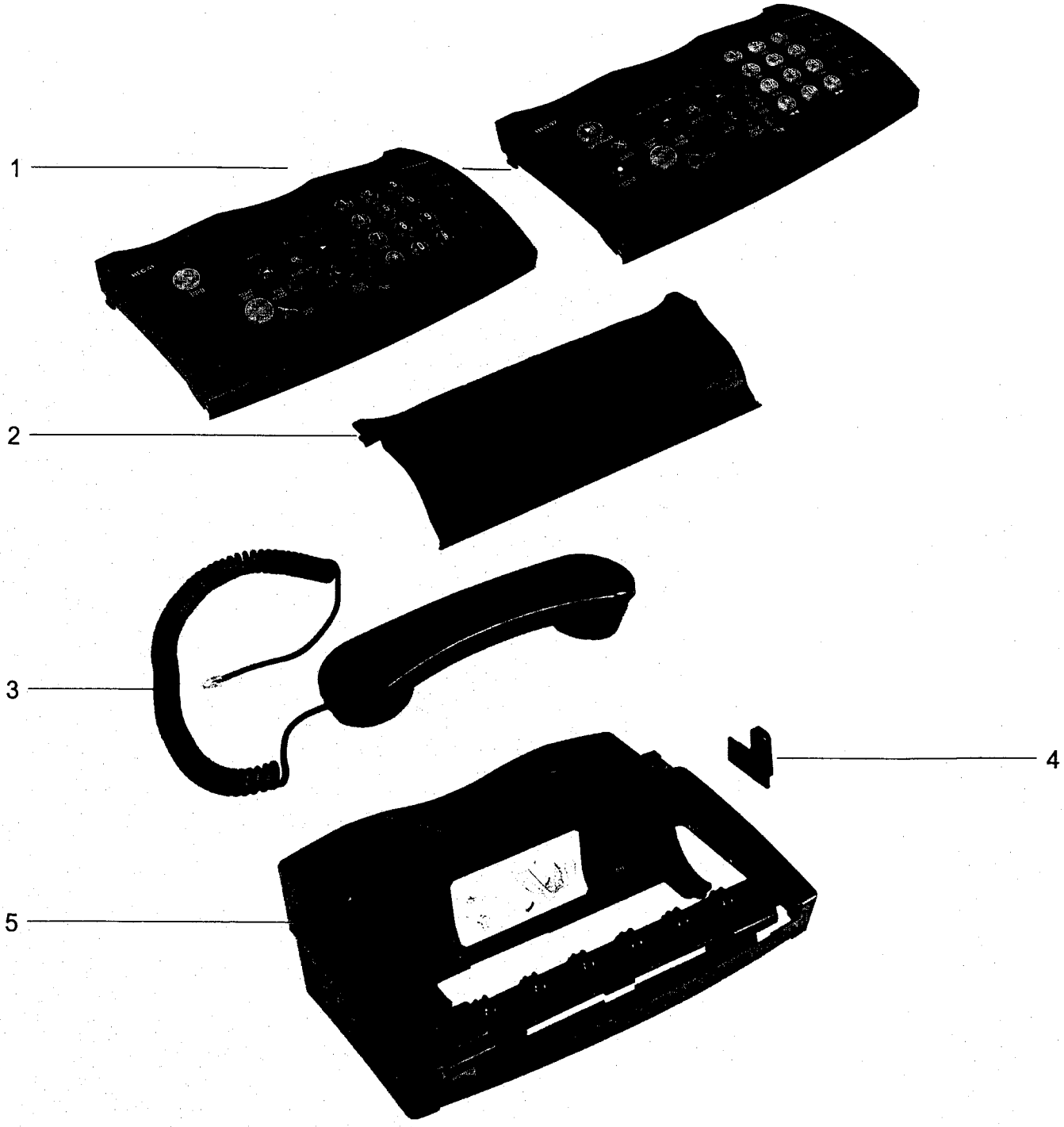
Items	Specification
Voice request	Voice request at the end of communication is in accordance with the ITU T30 protocol. (User has to lift the handset before end of communication.)
Automatic starting receiving fax	TEL/FAX-mode: When the machine detects a CNG signal reception starts automatically. Else the machine starts receiving after the programmed ring counts.
Manual starting receiving fax	Transmission starts when manual operation is performed (start key).
Copy mode	Copy operation is possible, using internal scanner and printer.
Time indicator 1. Time accuracy 2. Clock adjustment	 ± 4 min/month Possible to adjust the time using operation panel.
Power save mode	Less than 2W - Power save after 2min.

10.1.7 Audible alarm

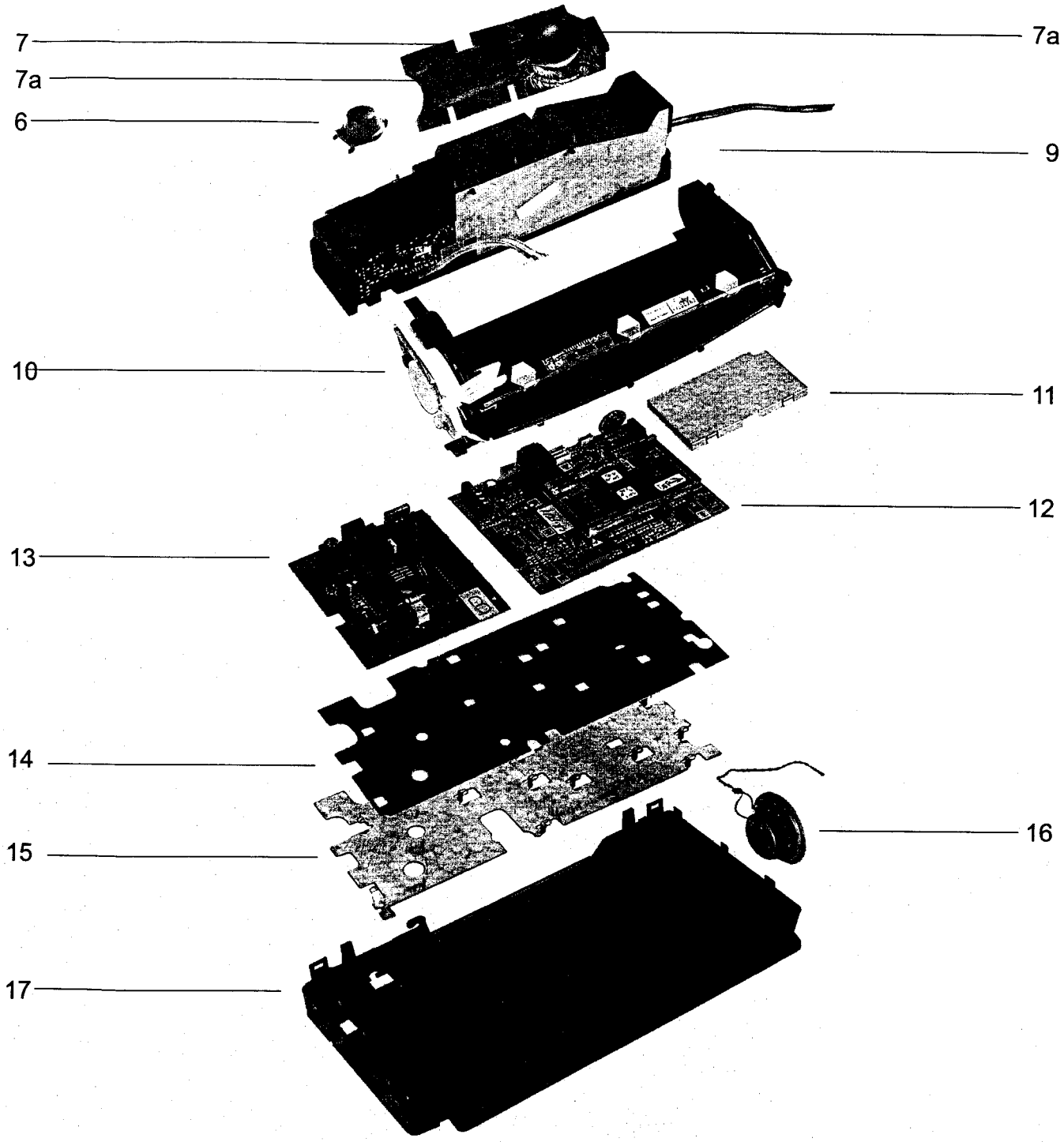
Items	Specification
Continuous sound (3 sec.)	Error LED is flashing.
Continuous sound (1 sec.)	End of communication. With fax reception not necessary
Discrete sound (22 sec., on/off: 1/1 sec.)	Handset off-hook
Key confirmation	Confirmation of key press ACK tone (40 msec.) - 2kHz NAK tone (3x20 msec.) - 2kHz

11 PARTSLIST

11.1 MECHANICAL AND ELECTRICAL PARTS



Nr.:	Description	Remark	Service Code	Factory code
1	Front panel, complete	only HFC41	4822 459 04618	5103 508 79320
1	Front panel, complete	only HFC42	4822 459 04617	5103 508 79330
2	Paper guide		4822 463 11147	5103 504 19850
3	Handset		4822 447 10571	5103 508 78210
3	Handset without cable			5103 508 79590
3	Handset cable			5103 508 79780
4	Distance plate		4822 466 11363	5103 504 18420
5	Top Part		4822 442 01006	5103 504 18500



Nr.:	Description	Remark	Old Service Code	Service Code
6	Hookswitch cruicible			5103 504 18820
7	Cooling Plate			5103 501 70140
7a	Foam Rubbers	2 pc. 1large - 1 small		5103 504 41510
9	PGU			5103 509 21200
10	Mechanical module **	CIS+ TPH Assy.		5103 509 43140
11	Shielding plate FCU			5103 501 42270
12	FCU	HFC41		5103 508 13060
12	FCU	HFC42		5103 508 13070
13	LIU-D			5103 508 13080
13	LIU-NL			5103 508 13130
13	LIU-A			5103 508 13110
13	LIU-B			5103 508 13120
14	Isolation plate		4822 466 11366	-
15	Bottom shielding			5103 501 42270
16	Loudspeaker			5103 508 77430
17	Bottom cover			5103 509 43150

** The CIS and TPH can be also acquire as single Items. See Modules, page 3-27

11.2 CABLES

Nr.:	Description	Remark	Old Service Code	Service Code
	Cable-19p (FCU-LIU)			5103 507 83290
	Telephone cable-D			5103 507 83060
	Telephone cable-NL			5103 507 82700
	Telephone cable- A			5103 507 83090
	Telephone cable-UNI			5103 507 82280
	Telephone Plug B			5103 508 73370
	Adapter cable			5103 508 79400

11.3 MODULES

Nr.:	Description	Remark	Service Code	Factory Code
	CIS-Modul			5103 509 43080
	Thermohead - TPH			5103 508 77950
	IC empty 1 MB		4822 816 50063	
	User Manual-D			
	User Manual- NL			

11.4 MANUALS

Nr.:	Description	Remark	Service Code	Factory Code
	User Manual- D	HFC41		5103 506 15860
	User Manual-NL	HFC41		5103 506 15920
	User Manual- F	HFC41		5103 506 15930
	User Manual-D	HFC42		5103 506 15870
	User Manual-NL	HFC42		5103 506 15940
	User Manual-F	HFC42		5103 506 15950

11.5 SOFTWARE

Nr.:	Description	Remark	Service Code	Factory Code
	ROM set-D	HFC41	4822 900 11197	5103 509 31550
	ROM set-D	HFC42		5103 509 31560
	ROM set-NL	HFC42	4822 900 11193	5103 509 31570
	ROM set- A	HFC42	4822 900 11194	5103 509 31580
	ROM set- B	HFC42		5103 509 31590

11.6 ESD-EQUIPMENT

Nr.:	Description	Remark	Service Code	Factory Code
	Anti static table mat large		4822 466 10953	
	Anti static table mat small		4822 466 10958	
	Anti static wrist band		4822 395 10223	
	Connection box		4822 320 11307	
	Extendible cable		4822 320 11305	
	Connecting cable		4822 320 11306	
	Earth cable		4822 320 11308	
	Complete kit ESD3		4822 310 10671	
	Wristband tester		4822 344 13999	

12 GLOSSAR

ABC	Automatic Background Control
ACK	Acknowledge
AM	Amplitude Modulation
AVM	Auto Voice Message
bps	bits per second
BSW	Bitswitch
BT	British Telecom
BUZCLK	Buzzer Clock
BUZON	Buzzer On
CCD	Charge Coupled Device
CE	Consumer Electronic
CED	Called
CFR	Confirmation to Receive
CIS	Contact Image Sensor
CLK	Clock
CNG	Calling
CRP	Command Repeat
CSI	Called Subscriber Identification
DCN	Disconnect
DCS	Digital Command Signal
DEC	Decimal
DIS	Digital Identification Signal
DTMF	Dual Tone Multiple Frequency
EOM	End Of Message
EOP	End Of Procedure
ESD	Electrostatic Discharge
FAX	Facsimile
FCB	Fax Control Board
FCC	Flex Coiled Cable
FCF	Fax Control Field
FCU	Fax Control Unit
FM	Frequency Modulation
FOSCI	Fast Oscillator Input
FSK	Frequency Shift Keying
FTT	Failure To Train
HDLC	High Level Data Link Control
HEX	Hexadezimal
HW	Hardware
ICM	Incoming Message
ICR	Incoming Ring
ILED	Input LED
ITU	International Telecommunication Union (former CCITT)
LIU	Line Interface Unit
LCD	Liquid Crystal Display
LPF	Low Paß Filter
LS	Loudspeaker
MCF	Message Confirmation
MCL	Mercury Communications Limited
MHC	Modified Huffman Code
MICEN	Microphone Enable
MODEM	Modulator/Demodulator
MPS	Multi Page Signal
MRC	Modified Read Code
MRXD	Receive Data
MTXD	Transmit Data
NAK	Not Acknowledge
NCU	Network Control Unit
NSF	Non Standard Facilities
NSS	Non Standard Facilities Set-up
OGM	Outgoing Message
OPU	Operation Panel Unit
OTPROM	One Time Programmable ROM
P	Page
PABX	Private Automatic Branch Exchange
PCB	Printed Circuit Board
PFAIL	Power Fail
PGU	Power Generation Unit
PIN	Procedure Interrupt Negative
PIP	Procedure Interrupt Positive
PM	Phase Modulation
POTS	Power Off Telephone System
ppm	parts per million
PSAVE	Power Save
PWM	Pulse Width Modulation
QAM	Quadrature Amplitude Modulation
RB	Ring Back
RC	Resistor Capacitor
READ	Relative Element Address Designate
RTI	Remote Terminal Identification
RTN	Retrain Negative
RTP	Retrain Positive
RX	Receive
SBG	Signal Background control
SDI	Sensor Document In
SDIN	Sigma Delta in
SDOUT	Sigma Delta Out
SGP	Sensor Gear Position
SHC	Sensor Hook Cradle
SMPS	Switched Mode Power Supply
SOP	Sensor Out of Paper
SOSCI	Slow Oscillator Output
SSB	Sensor Board
SVI	Signal Video In
SW	Software
S&H	Sample and Hold
TCF	Training Check Field
TM2	Thermistor
TPH	Thermal Printer Head
TPHON	Thermal Head On
TSI	Transmitting Subscriber Identification
TTI	Transmit Terminal Identification
TX	Transmit
VIN	Video In

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